# STATE BOARD OF TECHNICAL EDUCATION, BIHAR

## Scheme of Teaching and Examinations for

## IV SEMESTER DIPLOMA IN TEXTILE ENGINEERING

**(Effective from Session 2020-21 Batch)**

## THEORY

| Sr. No. | SUBJECTS | SUBJECT CODE | TEACHING SCHEME | EXAMINATION – SCHEME | | | | | | | Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Periods per Week | Hours of Exam. | Teacher's Assessment (TA) Marks (A) | Class Test (CT) Marks (B) | End Semester Exam. (ESE) Marks (C) | Total Marks (A+B+C) | Pass Marks ESE | Pass Marks in the Subject | |
| 1. | Yarn Preparation & Weaving Calculation | 2028401 | 03 | 03 | 10 | 20 | 70 | 100 | 28 | 40 | 03 |
| 2. | Textile Testing | 2028402 | 03 | 03 | 10 | 20 | 70 | 100 | 28 | 40 | 03 |
| 3. | Textile Chemistry-I | 2028403 | 03 | 03 | 10 | 20 | 70 | 100 | 28 | 40 | 03 |
| 4. | Fabric Structure & Design-I | 2028404 | 03 | 03 | 10 | 20 | 70 | 100 | 28 | 40 | 03 |
| 5. | Man Made Fiber Technology | 2028405 | 03 | 03 | 10 | 20 | 70 | 100 | 28 | 40 | 03 |
| | | **Total: -** | **15** | | | | **350** | **500** | | | **15** |

## PRACTICAL

| Sr. No. | SUBJECTS | SUBJECT CODE | TEACHINGSCHEME | EXAMINATION – SCHEME | | | | | Credits |
|---|---|---|---|---|---|---|---|---|---|
| | | | Periods per Week | Hours of Exam. | Practical (ESE) | | Total Marks (A+B) | Pass Marks in the Subject | |
| | | | | | Internal (A) | External (B) | | | |
| 6. | Textile Testing Lab.-I | 2028406 | 04 50%Physical 50% Virtual | 03 | 15 | 35 | 50 | 20 | 02 |
| 7. | Textile Chemistry Lab I | 2028407 | 04 50%Physical 50% Virtual | 03 | 15 | 35 | 50 | 20 | 02 |
| 8. | Cloth Analysis & Designing Practice Lab-I | 2028408 | 02 50%Physical 50% Virtual | 03 | 15 | 35 | 50 | 20 | 01 |
| **Total: 10** | | | | | | | **150** | | **05** |

## TERM WORK

| Sr. No. | SUBJECTS | SUBJECT CODE | TEACHING SCHEME | EXAMINATION – SCHEME | | | | Credits |
|---|---|---|---|---|---|---|---|---|
| | | | Periods per week | Marks of Internal Examiner (X) | Marks of External Examiner (Y) | Total Marks (X+Y) | Pass Marks in the Subject | |
| 9. | Textile Testing (TW) | 2028409 | 02 | 07 | 18 | 25 | 10 | 01 |
| 10. | Textile Chemistry (T.W) | 2028410 | 02 | 07 | 18 | 25 | 10 | 01 |
| 11. | Course under Moocs / Swayam / Others (T.W) | 2028411 | 04 | 15 | 35 | 50 | 20 | 02 |
| **Total: - 08** | | | | | | **100** | | **04** |
| Total Periods per week Each of duration one Hours **= 33** | | | | | | **Total Marks = 750** | | **24** |

# YARN PREPARATION & WEAVING CALCULATION

| Subject Code 2028401 | Theory | | | No of Period in one session: 50 | | | Credits |
|---|---|---|---|---|---|---|---|
| | No. of Periods Per Week | | | Full Marks | : | 100 | 3 |
| | L | T | P/S | ESE | : | 70 | |
| | 03 | — | — | TA | : | 10 | |
| | | | | CT | : | 20 | |

**Rationale:** Yarn preparation and weaving calculation is one of the main activities for diploma holder technician in Textile Engineering. He is required to handle the yarn preparatory machines, tools and equipment and also supervise the yarn preparatory processes. He is also required to perform calculations regarding weaving. The subject is introduced to develop the understanding of yarn preparatory processes and weaving Calculation. It will help in discharge of his duties in the world of work as he can understand a problem, analyze the same and take an appropriate decision as and when the job demands.

**Objectives:** After Completion of the courses, student will be able to

- Define the terminologies related with yarn preparatory machines and process like winding, pirn winding.
- Explain the principle and working of the machine.
- Sketch the machine parts and label them and process of production and their related problem
- Understand the process of production and their related problem
- Calculate count of yarn in direct, indirect and universal system and its conversion
- Calculate Resultant and Arrange count,

| | **Topics** | **Periods** |
|---|---|---|
| 1 | Introduction | (04) |
| 2 | Yarn Numbering System | (08) |
| 3 | Warping. | (20) |
| 4 | Tensioner & Clearer. | (10) |
| 5 | Winding & Production Calculations | (08) |
| | **Total:** | **(50)** |

| **Contents (Theory)** | | **Hrs** | **Marks** |
|---|---|---|---|
| **Unit -1** | **Introduction**<br>1.1 Concept of Fabric, warp and weft, Flow chart of conversion of yarn to Fabric, A brief consideration of the principle, purpose, requirements of preparatory process involved in converting important natural, regenerated, synthetic and blended yarns in to appropriate packages | [04] | |
| **Unit -2** | **Yarn Numbering System**<br>2.1 Concept of different yarn numbering system – Direct Indirect and universal system with examples<br>2.2 Conversion from one system to another system in indirect system and direct system<br>2.3 Conversion from indirect system to direct system and vice – versa.<br>2.4 Folded yarns and resultant counts, Averages counts.<br>2.5 Costing of folded yarns | [08] | |

| | | | |
|---|---|---|---|
| **Unit -3** | **Winding**<br>3.1 **Winding:** Objectives of Winding, Different types of feed and delivery Packages, Important Definitions in Winding (Wind, Traverse ratio or wind ratio or wind per double traverse, Angle of wind, Coil angle),<br>3.2 **Winding Machine**, passage of material through winding machine, Zones of winding machine (Unwinding zone, Yarn tensioning and clearing zone, Winding zone).<br>3.3 **Classification of Winding Principles:** Drum-driven or random winders, Spindle-driven or precision winders. Drum-driven Winders.<br>3.4 **Patterning:** Path of Yarn on Cheese, Drawing the Path of yarn on Cheese.<br>3.5 **Spindle-driven Winders, Step Precision Winder or Digicone Winder.** Comparison matrix of winding principles of **Drum-driven, Spindle-driven and Digicone winder.**<br>3.6 **Pirn Winders:** Introduction, Conditions for Uniform Package (Cheese) Building, Drum-driven winder, Spindle-driven winder.<br>3.7 Conditions for Uniform Increase in Cone Diameter, Grooves on Winding Drums.<br>3.8 Technological development in Winding | [20] | |
| **Unit -4** | **Tensioner & Clearer**<br>**4.1 Yarn Tensioning:** Objective of Yarn Tensioning, Types of Tensioning Device (Additive type or disc type tensioner, Multiplicative type tensioner), Relation between Input and Output Tensions in Multiplicative Tensioner, Tension Variation During Unwinding from Cop Build Package.<br>**4.2 Yarn Clearing:** Objectives of Yarn Clearing, Types of yarn clearer: mechanical-fied, swinging and electronic, Principles of Measurement (Capacitance principle and Optical principle), Yarn Imperfections, Yarn Faults (Classimat Faults, Causes of Classimat Faults), Removal of Foreign and Coloured Fibres.<br>**4.3 Splicing:** Method of joining the yarn - splice and knot, knotting and splicing, Type of knots, Yarn<br>**4.**4 Winding for Package Dyeing, Defects in Winding (Ribbon or pattern, Stitches or jail, soft tip or base, Slough off), Winding and Yarn Hairiness. | [10] | |
| **Unit -5** | **Winding & Production Calculations:**<br>5.1 Winding parameters: Traverse length, Traverse ratio, winding speeds, Coil angle, Wind angle, Scroll of drum, Gain,<br>5.2 Assessment of clearer performance: Knot Factor, clearing efficiency<br>5.3 Basic production calculation of winding machine | [08] | |
| | **Total** | **50** | |

**Books Recommended: -**

| | | | |
|---|---|---|---|
| 1 | Yarn Preparation Vol.-I & Vol-II, Mahajan Publication, Ahmedabad. | - | R. Sen Gupta |
| 2 | Weaving Calculation | - | R. Sen Gupta |
| 3 | Yarn Winding | - | P.K. Banerjee |
| 4 | Winding | - | BTRA |
| 5 | Yarn Preparation. Volume I&II | - | J.T. Marsh |
| 6 | Modern Weaving Calculations. Vol-I | - | Singh |
| 7 | TFO- Technology and Techniques | - | Shree Nivasan Murthy |
| 8 | An Introduction to Winding and Warping, Bombay Private Circulation. | - | M. K. Talukdar. |

# TEXTILE TESTING

| Subject Code 2028402 | Theory | | | No of Period in one session : 50 | | | Credits |
|---|---|---|---|---|---|---|---|
| | No. of Periods Per Week | | | Full Marks | : | 100 | 03 |
| | L | T | P/S | ESE | : | 70 | |
| | 03 | — | — | TA | : | 10 | |
| | | | | CT | : | 20 | |

**Rationale**: The subject covers information about textile fibres, their structural and physical properties like length, fineness, tensile property etc. along with experimental methods to determine them. The knowledge of these topics are very much useful in process control and testing of textile fibres to control yarn and fabric properties.

**Objectives:**

- Learning the various testing methods for the measurement of the fibre properties.
- The student will be able to measure the properties and draw an appropriate conclusion.

| S.No. | Topics | Periods |
|---|---|---|
| 01. | Introduction | (01) |
| 02. | The Selection of Samples | (04) |
| 03. | Moisture Relations and Testing | (10) |
| 04. | Fibre Testing | (15) |
| 05. | Yarn Testing | (10) |
| 06. | The Elements of Statistics | (10) |
| | **Total:** | **(50)** |

| Contents (Theory) | | Hrs | Marks |
|---|---|---|---|
| **Unit -1** | **INTRODUCTION:**<br>1.1 The objectives of testing<br>12 Importance of testing quality control | **(01)** | |
| **Unit -2** | **THE SELECTION OF SAMPLES FOR TESTING**<br>2.1 Introduction, The Random Sample and the Biased Sample.<br>2.2 Methods of sampling for testing: Sampling by ISI Method and B.S.I. Method.<br>2.4 Determination of Fiber-Length (Silver form)<br>2.4.1 Squaring Technique<br>2.4.2 Cut Squaring Technique<br>2.5 Yarn Sampling Methods<br>2.6 Fabric Sampling Methods. | **(04)** | |
| **Unit -3** | **MOISTURE RELATIONS AND TESTING**<br>3.1 Introduction<br>3.2 Humidity and its importance to textile materials<br>3.3 Moisture Regain and Moisture Content<br>3.4 Absolute humidity and Relative humidity<br>3.5 Standard atmosphere and testing atmosphere<br>3.6 Standard condition for testing of textile material<br>3.7 Determination of the humidity<br>3.7.1 Wet-and-dry bulb hygrometer<br>3.7.2 Hair hygrometer<br>3.8 Regain –Humidity Relations of textiles.<br>3.9 Factors affecting the regain of textile material: (Relative humidity, time, temperature, previous history of sample)<br>3.10 Effects of regain of fibre properties<br>3.11 Oven dry weight and correct in voice weight.<br>3.12 Determination of moisture<br>3.12.1 Conditioning oven<br>3.12.2 Shirley moisture meter<br>3.13 Standard regain percentage of textile material (cotton, silk, wool, jute, nylon, acetate, polyester etc). | **(10)** | |

| | | | |
|---|---|---|---|
| **Unit -4** | **FIBRE TESTING**<br>4.1 **Fibre grade**<br>4.1.1 Determination of colour, trash by trash analyzer<br><br>4.2 **Fibre length**<br>4.2.1 Methods of Measuring fibre length<br>4.2.2.1 Comb sorter<br>4.2.2.2 Digital Fibro graph<br>4.2.2.3 Uster Staple Apparatus<br>4.3 **Fibre Fineness**<br>4.3.1 The importance of fibre fineness and definition of fineness<br>4.3.2 Methods of measuring fineness<br>4.3.2.1 Gravimetric Method<br>4.3.2.2 Optical Method<br>4.3.2.3 Air- flow Method- W.I.R.A Fineness Meter.<br><br>4.4 **Fibre maturity**<br><br>4.4.1 Introduction and importance of maturity<br>4.4.2 Maturity ratio, Maturity count<br>4.4.3 Determination of maturity<br>4.4.3.1 Alkaline Swelling Method<br>4.4.3.2 Polarized light method<br>4.4.3.3 Differential dyeing method<br><br>4.5 **Fibre strength**<br><br>4.5.1 Terminology and Definitions: Load, Breaking load, Stress, Tenacity or specific strength, Breaking length, Strain, Extension, Breaking extension, The load-elongation curve, The stress-strain curve, The initial Young's modulus, Yield point, Work of rupture, Work factor, Elastic recovery, Time and elastic properties.<br>4.5.2 Factors influencing strength test results.<br>4.5.3 Principle of CRL, CRE, CRT, type tensile testing machine<br>4.5.4 Methods of measuring the strength of fibres<br>4.5.5 Single fibre strength testing<br>4.5.6 Bundle (group) fibre strength testing<br>4.5.7 Pressley Strength tester<br>4.5.8 Stelometer. | **(15)** | |
| **Unit -5** | **YARN TESTING**<br>5.1 **Yarn Counts:** Definition, Concept of different yarn numbering system – Direct Indirect and universal system with examples. Conversion from one system to another system in indirect system and direct system. Conversion from indirect system to direct system and vice – versa. Folded yarns and resultant counts, Averages counts.<br>5.2 Measurement of Length of yarn: Method of Length measuring by Hand wrap reel and Motorized warp reel.<br><br>5.4 Yarn in short length (or piece of cloth)<br><br>5.5 Instruments used for count determination: Analytical Balance, Knowles Balance, Quadrant Balance, Beesley's Balance, etc. | **(10)** | |

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|---|---|---|---|
| **Unit -6** | **THE ELEMENTS OF STATISTICS**<br>6.1 Definition<br>6.2 Importance in testing<br><br>6.3 Definition of terms used in statistics such as sample, sampling, sample size, population, histogram, frequency polygon, frequency polygon, frequency, curve, and frequency distribution.<br><br>6.4 Average and other methods of location: Arithmetic Mean, Median and Mode. The relationship between methods of location.<br><br>6.5 The Measurement of Dispersion or scatter-Range, mean range, percentage mean range, inter-quartile range, mean deviation, percentage mean deviation, standard deviation, co-efficient of variation, variation, variance and standard deviation.<br><br>6.6 Probability<br>6.7 Problems. | **(10)** | |
| | **Total** | **50** | |

**Books Recommended:**

01. Principle of Textile Testing - J.E. Booth
02. Hand Books of Methods of Testing - C.T.R.L.
03. Hand Books of Textile Testing & Quality Control - Grover
04. ISI Hand Books of Textile Testing - I.S.I.
05 Textile Testing - Skinkle
06. Textile Testing - Angappan
07. Textile Testing and Analysis - Vaishnav. Joshi

# TEXTILE CHEMISTRY-I

| Subject Code 2028403 | Theory | | | No of Period in one session : 50 | | | Credits |
|---|---|---|---|---|---|---|---|
| | No. of Periods Per Week | | | Full Marks | : | 100 | 3 |
| | L | T | P/S | ESE | : | 70 | |
| | 03 | — | — | TA | : | 10 | |
| | | | | CT | : | 20 | |

**Rational:-**

Textile chemistry is one of the main activities for a diploma holder technician in textile Engineering. He is required to apply different types of dyes on different types of textile fibre, printing and wet processing. He must be well versed with the subject of textile chemistry.

**Objective**

After completion of the course student will be able to -

- Define the terminologies related with textile chemistry
- Explain the principle and working of the dyeing and printing processes
- Methods of application of dyes.
- Understand wet processing like singeing, Desizings, Scouring, Bleaching. Mercerization and their related problem.

| Contents (Theory) | | Hrs | Marks |
|---|---|---|---|
| **Unit -1** | **Singeing[03]**<br>01.01 Objects of Singeing<br>01.02 Methods of singeing by various singeing machines - Plate singeing, Roller singeing, Gas singeing.<br>01.03 Merits and demerits of these above singeing machines | [03] | |
| **Unit -2** | **Desizing [05]**<br>02.01 Objects of Desizing<br>02.02 Methods of desizing - Hydrolytic and oxidative<br>02.02.01 Description and working of Hydrolytic desizing method - Rot steep, Acid steep, Enzymatic desizing, continuous desizing method.<br>02.02.02 Description and working of oxidative desizing method - chlorine desizing, chlorite desizing, Bromite desizing, Continuous desizing. | [05] | |
| **Unit -3** | **Scouring [05]**<br>03.01 Objects of Scouring<br>03.02 Scouring operation - Saphonification, Emulsification Detergent action, Prolonged boiling<br>03.03 Machines used for batch wise and continuous Scouring - Jigger and Winch machine<br>03.04 Kier – old type kier, vertical kier, Horizontal kier<br>03.05 Comparison of horizontal and vertical kier<br>03.06 Steam injector kier<br>03.07 Scouring and bleaching agents for cotton, wool silk. | [05] | |
| **Unit -4** | **Bleaching [06]**<br>04.01 Objects of bleaching<br>04.02 Bleaching of cotton<br>04.03 Bleaching process- Bleaching powder, Sodium hypochlorite, Hydrogen peroxide, sodium chlorite.<br>04.04 Advantages and disadvantages of above processes<br>04.05 Bleaching of Wool<br>04.06 Wool Carbonisation<br>04.07 Bleaching of silk – sodium peroxides method,$H_2O_2$ method<br>04.08 Optical whitening agents.<br>04.09 Application of Hydrogen peroxides- one or two bath method , mixed bleaching , continuous method, Du pont process<br>04.10 Machines used for continuous bleaching<br>04.11 Developments in bleaching<br>04.12 Souring, Antichlorination<br>04.13 Different types of bleaching agents and optimum conditions for various operators.<br>04.14 Methods used for determination of degradation of cotton during scouring and bleaching<br>04.15 Faults in bleaching and their prevention | [06] | |

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|---|---|---|---|
| **Unit -5** | **Mercerization [06]**<br>05.01 History and developments of mercerization<br>05.02 Factors determining the efficiency of mercerization<br>05.03 Physical and chemical changes in cotton due to mercerization<br>05.04 Methods and machines used for mercerization chain cloth mercerizing machines, chainless cloth mercerizing machine , chainless padless mercerizing machine<br>05.05 Hank Mercerization and Hot mercerization<br>05.06 Evaluation of different chemicals, solvents used in wet processing and their importance. | [06] | |
| **Unit -6** | **Dyeing [13]**<br>06.01 Historical developments of dyes and their applications<br>06.02 Classification of dyes to mode of application<br>06.03 Theory of dyeing<br>06.04 Introduction to physical and chemical principles involved in dyeing<br>06.05 Factors affecting dyeing<br>06.06 Properties, selection and application of various dyes like – Direct, Basic, Acid, Sulphur dyes used on cotton, wool silk.<br>06.07 Various after treatment given to sulphur dyed goods | [13] | |
| **Unit -7** | **Printing [12]**<br>07.01 Historical developments of decorating textiles especially by printing, the scope of printed textiles.<br>07.02 The printing process on overview<br>07.03 Difference between dyeing and printing<br>07.04 Methods of printing-<br>07.04.01 Block printing - Preparation and use of blocks<br>07.04.02 Screen printing - Principle and working of screen printing<br>07.04.03 Roller printing- Principle and working of Roller printing<br>07.05 Vertical Duplex screen printing<br>07.06 Rotary Screen printing<br>07.07 Transfer printing and foam printing | [12] | |
| | **Total-** | 50 | |

**Books Recommended :-**

| | | | |
|---|---|---|---|
| 1. | A glimpse on chemical Technology of textile fibres | - | R.R Chakraworty |
| 2. | Chemical technology of fibrous materials | _ | Sadov MIR Publications. |
| 3. | Textile chemistry Vol I and II | - | R.H. peters, Elsewhere Publishing Co, New York. |
| 4. | Dyeing and chemical Technology of Textile fibres | - | ER Trotman |
| 5. | Scouring and bleaching of Cotton | - | J.T.Marsh, B.I Publications |
| 6. | Mercerization | - | J.T. marsh, B I Publications. |
| 7. | Technology of textile processing Vol III | - | V.A. Shenai, Sevak Publications |
| 8. | Textile chemistry vol I, II and III | - | R.H peters Elsewhere publishing Co, New York |
| 9. | Modern Techniques of textile Bleaching, Dyeing and finishing | - | SITRA Pub. |
| 10. | Textile printing | - | Miller , L.W.C. Butter worths Publications |
| 11. | Printing Textiles | | A guide to creative design Fundamentals terry and genteelly |

# FABRIC STRUCTURE AND DESIGN-I

| Subject Code 2028404 | Theory | | | No of Period in one session: 50 | | | Credits |
|---|---|---|---|---|---|---|---|
| | No. of Periods Per Week | | | Full Marks | : | 100 | 3 |
| | L | T | P/S | ESE | : | 70 | |
| | 03 | — | — | TA | : | 10 | |
| | | | | CT | : | 20 | |

**Rationale**: Study of fabric manufacture i.e, weaving is incomplete without the knowledge of fabric structure. This subject is aimed at educating student about more elaborate weaves like Plain, Twill, Satin, Honeycomb, Bedford Cord, Pique which are used in furnishing. Also, this subject deals with concept of colour and weaves effect, which is very important in Textile Designing.

| Contents (Theory) | | Hrs | Marks |
|---|---|---|---|
| **Unit -1** | **ELEMENTS OF WOVEN DESIGN: [07]**<br>01.01 General Principle of fabric structure and design<br>01.02 Classification of woven fabrics<br>01.03 Methods of fabric representation<br>01.04 Use of the design<br>01.05 Repeat of the design<br>01.06 Basic elements of a woven design: design, draft or Drawing-in, lifting or peg plan, Denting Plan.<br>01.07 Systems of drafting<br>01.08 Construction of drafts and lifting plans<br>01.08.01 Methods of indicating drafts and lifting plans<br>01.08.02 Relations between design, draft, and lifting plan.<br>01.08.03 Construction of drafts and lifting plan from given designs.<br>01.08.04 Construction of drafts from given designs and lifting plans.<br>01.08.05 Construction of designs from given drafts and lifting plans. | [07] | |
| **Unit -2** | **CONSTRUCTION OF ELEMENTARY WEAVES: [06]**<br>02.01 Study of plain weaves<br>02.02 Classification of plain weave<br>02.03 Simple twill weaves and its construction<br>02.04 Sateen and satin weaves<br>02.04.01 Regular sateens and satins<br>02.04.02 Irregular sateens and satins | [06] | |
| **Unit -3** | **DEVELOPMENT OF WEAVES FROM ELEMENTARY BASES:[11]**<br>03.01 Plain weave derivatives<br>03.01.01 Warp rib weaves<br>03.01.02 Weft rib weaves<br>03.01.03 Hopsack, mat or basket weaves<br>03.01.04 Mock rib effects<br>03.02 Weaves constructed on Twill Bases<br>03.02.01 Waved twills or Pointed or Zig-zag twills<br>03.02.02 Herringbone twills<br>03.02.03 Broken twills<br>03.02.04 Elongated twills<br>03.02.05 Combined twills<br>03.02.06 Fancy twills.<br>03.03 The Angle of Twills, Factors determining the prominence of twill weaves, comparison of the firmness of twills.<br>03.04 Weaves constructed on satin of sateen bases | [11] | |
| **Unit -4** | **DIAMOND AND DIAPER DESIGNS: [04]**<br>04.01 Introduction.<br>04.02 Construction of diamond designs<br>04.02 Construction of diaper designs<br>04.03 Comparison between diamond and diaper designs. | [04] | |

| | | | |
|---|---|---|---|
| **Unit -5** | **SIMPLE FANCY WEAVES: [12]**<br>05.01 Principles of designing honey comb weave<br>05.02 Types of honey comb weaves<br>05.02.01 Ordinary honey comb weaves<br>05.02.02 Brighton honey comb weaves<br>05.03 Huckaback weaves<br>05.04 Mock Leno Weaves<br>05.05 Crepe weaves<br>05.06 Bedford cords<br>05.06.01 Wadded bedford cords<br>05.06.02 Crepon bedford cords<br>05.06.03 Bedford cords, arranged with alternate picks<br>05.06.04 Twill- faced Bedford cords<br>05.07 Welts and piques<br>05.11 Stripe and check weave combinations | [12] | |
| **Unit -6** | **YARN DIAMETERS AND COVERFACTOR:[05]**<br>06.01 Diameter of yarn and their calculations regarding their in fabric<br>06.02 Classification of Plain Cloths; Square Plain Cloths.<br>06.02 Brief idea of structure of cover factor of simple fabrics<br>06.03 Quality particulars of different fabrics of the above weave. | [05] | |
| **Unit -7** | **COLOUR AND ITS APPLICATION: [05]**<br>07.01 Light and colour phenomena<br>07.01.01 Physical baiss of colour<br>07.01.02 Emission and absorption of light<br>07.02 Theories of Colour: Light theory and Pigment theory.<br>07.02.01 Light theory of colour: Complementary colour, The Chromatic Circle, Colour measurement.<br>07.02.02 Pigment theory of colour<br>07.02.03 Visual effects or attributes of various colours.<br>07.03 Modification of colours<br>07.04 Colours in combination: Colour contrast, Contrast of hue, Contrast of tone, Colour harmony.<br>07.05 Colour Mixing: The rainbow, additive colour mixing, subtractive colour mixing.<br>07.06 **Appication of colour:** Mixed colour effects, fibre mixtures, twist yarn mixtures, combinations of differenty coloured threads, colour stripes and checks, simple regular patterns, simple irregualr patterns, compound orders of colouring, etc.<br>Mixed colour effects, fibre mixtures, twist yarn mixtures, combinations of differenty coloured threads, colour stripes and checks, simple regular patterns, simple irregualr patterns, compound orders of colouring etc. | [05] | |
| | **Total** | **50** | |

## Books Recommended:-

| | | | |
|---|---|---|---|
| 01. | Watson's Textile Design and Colour | - | Z. Grosicki |
| 02. | Cloth Construction | - | Robinson and Marks |
| 03. | Grammer of Textile Desing | - | Nisbet |
| 04. | Structure Fabric Deign | - | Kilbbe |
| 05. | Textile Colour Mixing | - | Paterson |

# MAN MADE FIBRE TECHNOLOGY

| Subject Code 2028405 | Theory | | | No of Period in one session : 50 | | | Credits |
|---|---|---|---|---|---|---|---|
| | No. of Periods Per Week | | | Full Marks | : | 100 | 3 |
| | L | T | P/S | ESE | : | 70 | |
| | 03 | — | — | TA | : | 10 | |
| | | | | CT | : | 20 | |

**Rationale :**

Fabric made of man-made Fibres are much in demand because of its durability and easy maintenance. The production, therefore, of the man-made fibres has increased keeping the pace with market demand. This course deals with the study of various concepts and technologies used in manmade fibre manufacturing process.

**Objective:**

Students will be able to understand: -

- Process of manufacture of Viscose Rayon, Cellulose Acetate, Polynosic rayon, Polyamide fibres, Polyesters, Polyvinyl Chloride, Orlon, Acrilian, Polypropyline.
- Their chemical behaviour, the properties of the fibres and their uses.
- The application of the process, properties, chemical behaviour in actual manufacturing of the man made fibres.

| S.No. | Topics | Periods |
|---|---|---|
| 01 | Man Made fibre Spinning. | (06) |
| 02 | Fibre made from natural polymer. | (16) |
| 03 | Synthetic fibres. | (21) |
| 04 | Conversion and developments. | (07) |
| | **Total :** | **(50)** |

| Contents (Theory) | | | Hrs | Marks |
|---|---|---|---|---|
| **Unit-1** | **MAN MADE FIBRE SPINNING:** | | **[06]** | |
| | 01.01 | Fibre forming Polymers, Brief idea about Polymerization Techniques, Viscosity of melts and solution. | | |
| | 01.02 | General principles of spinning- Melt Spinning, Dry Spinning, Wet Spinning Process. Advantages and Disadvantages of Different Spinning Process | | |
| **Unit-2** | **FIBRE MADE FROM NATURAL POLYMER:** | | **[16]** | |
| | 02.01 | Introduction of various manmade fibre based on natural polymers. | | |
| | 02.02 | Manufacture of various man-made fibre based on natural polymers like viscose, cellulose, Acetate, Cupramonium rayon. | | |
| | 02.03 | Physical and chemical properties of above fibres. | | |
| | 02.04 | Uses of above fibres. | | |
| | 02.05 | Need for drawing, factors influencing drawing, influence of drawing on structure of fibres. | | |
| **Unit-3** | **SYNTHETIC FIBRES:** | | **[21]** | |
| | 03.01 | Introduction of various synthetic fibres. | | |
| | 03.02 | Manufacture of various synthetic fibres like Polyamide (Nylon 6,Nylon 66), Polyester (Polyethylene terephthalate), Polyloefine (Polyethylene, Poly prophylene) , Polyacrylontrile. | | |
| | 03.03 | Need for drawing, factors influencing drawing, influence of drawing on structure. | | |
| | 03.04 | Physical and chemical properties of above fibres. | | |
| | 03.05 | Uses of above fibres. | | |
| **Unit-4** | **CONVERSION AND DEVELOPMENTS:** | | **[07]** | |
| | 04.01 | Detailed study of low to top conversion-cut method, stretch breaking method, perlock method. | | |
| | 04.02 | Need for Spin finish application in fibre processing. | | |
| | 04.03 | Spin finish composition and spin finish application method. | | |
| | 04.04 | Elastomeric fibres of spandex type, Chloro fibres, Bi-Component fibres. | | |
| | | **Total** | **50** | |

**Reference Books :**


1. Man Made Fibre, Wirley & Sons. - Moncriff.
2. Textile Yarns. - B. C. Goswami.
3. Man Made Fibres, Mir publication. - Usenko.
4. A Textiles Book of Fiber Science and Technology - S.P. Mishra

# TEXTILE TESTING Lab.-I

| Subject Code 2028406 | Practical | | | No of Period in one session : 60 | | | Credits |
|---|---|---|---|---|---|---|---|
| | No. of Periods Per Week | | | Full Marks | : | 50 | 03 |
| | L | T | P/S | ESE | : | 50 | |
| | — | — | 04 | Internal | : | 15 | |
| | | | | External | : | 35 | |

| S. No. | Units | Periods |
|---|---|---|
| 01. | Sampling | (06) |
| 02. | Fibre Testing | (24) |
| 03. | Moisture Relation Testing | (06) |
| 04. | Identification and Estimation of Fibres in Textile Materials | (15) |
| 05. | Yarn Testing | (09) |
| | **Total** | **(60)** |

| Contents (Practical) | | Hrs | Marks |
|---|---|---|---|
| **Unit -1** | **SAMPLING**<br>01.01 Sampling of raw cotton by ISI Method and estimate ginning percentage and lint index.<br>01.02 Sampling of cotton by B.S.I. method and estimate ginning percentage and lint index. | (06) | |
| **Unit -2** | **FIBRE TESTING**<br>02.01 Fibre length<br>02.01.01 Determination of fibre length by Halo and Butterfly Method.<br>02.01.02 Determination of fibre length by Baer Sorter Method.<br>02.01.03 Determination of fibre length by Balls Sorter Method.<br>02.01.04 Determination of fibre length parameters using Uster Stapler.<br>02.02 Fibre Fineness<br>02.02.01 Determination of fibre fineness by Gravimetric method.<br>02.02.02 Determination of fibre fineness by Air-flow method. (WIRA Fineness Meter)<br>02.03 Fibre Maturity<br>02.03.01 Determination of percentage maturity of cotton by polarized light (Microscope) Method.<br>02.03.02 Determination of Maturity Co –efficient by Alkaline method.<br>02.04 Fibre Strength.<br>02.04.01 Determination of single fibre strength by the instruments available in laboratory.<br>02.04.02 Determination of Bundle fibre strength by Stelometer. | (24) | |
| **Unit -3** | **MOISTURE RELATIONS TESTING**<br>03.01 Determination of moisture regains moisture content and legal weights by using conditioning oven. | (06) | |
| **Unit -4** | **IDENTIFICATION AND ESTIMATION OF FIBRES IN TEXTILE MATERIALS**<br>04.01 Identification of textile fibres.<br>04.01.01 Identification of fibres by longitudinal view using optical microscope also determine the mean width o fibres.<br>04.01.02 Identification of fibres by cross-sectional view using microscope.<br>04.01.03 Identification of Textile material by chemical analysis and also burning test of fibres.<br>04.01.04 Quantitative Analysis and Estimation of Mixture of fibres in textile materials. | (15) | |
| **Unit -5** | **YARN TESTING**<br>05.01 Determination of Yarn Count by:<br>05.01.01 Beesley's Balance03<br>05.01.02 Quadrant Balance03<br>05.01.03 Torsion Balance & Analytical Balance | (09) | |
| | **Total** | **60** | |

# TEXTILE CHEMISTRY Lab. – I

| Subject Code 2028407 | Practical | | | No of Period in one session : 60 | | | Credits |
|---|---|---|---|---|---|---|---|
| | No. of Periods Per Week | | | Full Marks | : | 50 | 2 |
| | L | T | P/S | ESE | : | 50 | |
| | — | — | 04 | Internal | : | 15 | |
| | | | | External | : | 35 | |

**Rational: -**

Diploma holder technician in Textile Engineering is very frequently required to dye the fabric, Scouring and bleaching of fabrics and printing of fabrics.

The Course is introduced to develop the skill to dye the cellulosic material with Direct, Acid, Basic, Sulphur, scouring and bleaching of cotton, silk, wool, Printing of natural fibre for letter understanding of the subject.

**Objectives: -**

The students will be able to develop skill for -

- Scouring and bleaching of cotton, silk, wool
- Dyeing of cotton with Direct dyes.
- Dyeing of Cotton, wool, silk, with basic dyes
- Dyeing of wool, silk, with Acid dyes
- Dyeing of Cotton with sulphur dyes
- Printing of fabric

| Contents (Practical) | | Hrs | Marks |
|---|---|---|---|
| **Unit -1** | **Scouring [06]**<br>01.01 Experimental Scouring of cotton, Wool, silk and other important textile fibres, yarns and fabrics. | [06] | |
| **Unit -2** | **Bleaching [06]**<br>01.02 Experimental Bleaching of cotton, Wool, silk and other important textile fibres, yarns and fabrics. | [06] | |
| **Unit -3** | **Dyeing [33]**<br>03.01 Familiarizing and sketching of various tools and machines used in wet processing.<br>03.02 Evaluation of inorganic and other substances used in textile processing like soda ash, bleaching powder, hydrogen peroxides, sodium sulphate, hydrosulphate,<br>03.03 Dying of three shades with direct dyes on cotton (0.5%, 0.8%, 1.2%, 1.5 %,)<br>03.04 Dying of three shades with basic dyes on cotton (0.5%, 1%, 1.3%, 1.5 %,)<br>03.05 Dying of three shades with basic dyes on silk, wool, (0.5%, 1.2%, 1.5%, 1.8 %,)<br>03.06 Dying of three shades with acid dyes on wool, silk (0.5%, 0.8%, 1.2%, 1.5 %,)<br>03.07 Dying of three shades with Sulphur dyes on cotton (0.5%, 0.8%, 1.2%, 1.5 %,)<br>03.08 After treatment given to direct colour and sulphur colour dyed goods.<br>03.09 To study the effect of fine, temperature, concert ration of chemicals during dyeing . | [33] | |
| **Unit -4** | **Printing [15]**<br>04.01 Practice of block printing on paper and fabrics (cotton, silk)<br>04.02 Preparation of designs for printing systems.<br>04.03 Printing paste preparation<br>04.04 Study the Roller printing machines and practice of them on fabric (cotton, silk)<br>04.05 Study the screen printing constituents - screen table, screen, exposing unit, washing tray. | [15] | |
| | **Total-** | 60 | |

# CLOTH ANALYSIS & DESIGNING PRACTICE LAB-I

| Subject Code 2028408 | Practical | | | No of Period in one session : 60 | | | Credits |
|---|---|---|---|---|---|---|---|
| | No. of Periods Per Week | | | Full Marks | : | 50 | 2 |
| | L | T | P/S | ESE | : | 50 | |
| | — | — | 02 | Internal | : | 15 | |
| | | | | External | : | 35 | |

**Rational: -**

Diploma holder technician in Textile Engineering is very frequently require to analyses the sample for the purpose of reproduction.

The course is introduced to develop the skill to analyze the sample, representation of weave in point paper and its design and peg plan, preparation of colour chart, preparation of common design and free hand sketching for better understanding of the subject.

Objectives: -

Able to develop skill to

- Analyze the test sample
- Representation of weave in point paper and find out draft, denting and its lifting plan for weaving.
- Preparation of colour chart, common and saree border design
- Free hand sketching.

| Contents (Practical) | | Hrs | Marks |
|---|---|---|---|
| **Unit -1** | **Cloth Analysis [45]**<br>01.01 Discussion on the method of analysis, representation of weave on point paper, thread interacting diagrams, cross section diagrams, drawing – in, drafts and peg plans.<br>01.02 Discussion on the Analysis and fabric manufacturing data. Study of the method of analysis.<br>01.03 Studying the characteristics of various plain weave fabrics. Dissecting and finding various data of the given plain weave fabrics.<br>01.04 Analysis of matt weave fabrics for their characteristics and various data<br>01.05 Analysis of twill weave fabrics for their characteristics.<br>01.06 Analysis of Honey comb and Brighton Honey comb weaves fabrics for their characteristics.<br>01.07 Analysis of Mockleno and Huckaback weave fabrics<br>01.08 Analysis of crepe like effect fabrics<br>01.09 Analysis of woven crepe effect fabrics.<br>01.10 Analysis of combination of weaves fabrics.<br>01.11 Analysis of Decorative natural silk fabrics.<br>01.12 Analysis of Decorative Artificial silk weave fabrics<br>01.13 Analysis of Decorative polyester fabrics.<br>01.14 Analysis of satin and sateen weave fabrics.<br>01.15 Analysis of Bed ford cord fabrics.<br>01.16 Analysis of Pique fabrics. | [45] | |
| **Unit -2** | **Design and color [15]**<br>02.01 Preparation of colour charts showing primary, secondary, and tertiary colour<br>02.02 Preparation of mixed colour effect<br>02.03 Practice of colour harmony and contrast<br>02.04 Preparation of small border design<br>02.05 Free hand sketching<br>02.06 Preparation of design for jacquard | [15] | |
| | **Total-** | **60** | |

# TEXTILE TESTING TW-I

| Subject Code 2028409 | Term Work | | | No of Period in one session: 60 | | | Credits |
|---|---|---|---|---|---|---|---|
| | No. of Periods Per Week | | | Full Marks | : | 25 | 01 |
| | L | T | P/S | Internal Examiner | : | 07 | |
| | — | — | 02 | External Examiner | : | 18 | |

| S.No. | Units | Periods |
|---|---|---|
| 01. | Sampling | (06) |
| 02. | Fibre Testing | (24) |
| 03. | Moisture Relation Testing | (06) |
| 04. | Identification and Estimation of Fibres in Textile Materials | (15) |
| 05. | Yarn Testing | (09) |
| | **Total** | **(60)** |

| Contents (Term Work) | | Hrs | Marks |
|---|---|---|---|
| **Unit -1** | **SAMPLING**<br>01.01 Sampling of raw cotton by ISI Method and estimate ginning percentage and lint index.03<br>01.02 Sampling of cotton by B.S.I. method and estimate ginning percentage and lint index. | (06) | |
| **Unit -2** | **FIBRE TESTING**<br>02.01 Fibre length<br>02.01.01 Determination of fibre length by Halo and Butterfly Method.<br>02.01.02 Determination of fibre length by Baer Sorter Method.<br>02.01.03 Determination of fibre length by Balls Sorter Method.<br>02.01.04 Determination of fibre length parameters using Uster Stapler.<br>02.02 Fibre Fineness<br>02.02.01 Determination of fibre fineness by Gravimetric method.<br>02.02.02 Determination of fibre fineness by Air-flow method. (WIRA Fineness Meter)<br>02.03 Fibre Maturity<br>02.03.01 Determination of percentage maturity of cotton by polarized light (Microscope) Method.<br>02.03.02 Determination of Maturity Co –efficient by Alkaline method.<br>02.04 Fibre Strength.<br>02.04.01 Determination of single fibre strength by the instruments available in laboratory.<br>02.04.02 Determination of Bundle fibre strength by Stelometer. | (24) | |
| **Unit -3** | **MOISTURE RELATIONS TESTING**<br>03.01 Determination of moisture regains moisture content and legal weights by using conditioning oven. | (06) | |
| **Unit -4** | **IDENTIFICATION AND ESTIMATION OF FIBRES IN TEXTILE MATERIALS**<br>04.01 Identification of textile fibres.<br>04.01.01 Identification of fibres by longitudinal view using optical microscope also determine the mean width o fibres.<br>04.01.02 Identification of fibres by cross-sectional view using microscope.<br>04.01.03 Identification of Textile material by chemical analysis and also burning test of fibres.<br>04.01.04 Quantitative Analysis and Estimation of Mixture of fibres in textile materials. | (15) | |
| **Unit -5** | **YARN TESTING**<br>05.01 Determination of Yarn Count by:<br>05.01.01 Beesley's Balance<br>05.01.02 Quadrant Balance<br>05.01.03 Torsion Balance & Analytical Balance | (09) | |
| | **Total** | **60** | |

# TEXTILE CHEMISTRY TW-I

| Subject Code 2028410 | Term Work | | | No of Period in one session : 60 | | | Credits |
|---|---|---|---|---|---|---|---|
| | No. of Periods Per Week | | | Full Marks | : | 25 | 01 |
| | L | T | P/S | Internal Examiner | : | 07 | |
| | — | — | 02 | External Examiner | : | 18 | |

**Rational: -**

Diploma holder technician in Textile Engineering is very frequently required to dye the fabric, Scouring and bleaching of fabrics and printing of fabrics.

The Course is introduced to develop the skill to dye the cellulosic material with Direct, Acid, Basic, Sulphur, scouring and bleaching of cotton, silk, wool, Printing of natural fiber for letter understanding of the subject.

**Objectives: -**

The students will be able to develop skill for -

- Scouring and bleaching of cotton, silk, wool
- Dyeing of cotton with Direct dyes.
- Dyeing of Cotton, wool, silk, with basic dyes
- Dyeing of wool, silk, with Acid dyes
- Dyeing of Cotton with Sulphur dyes
- Printing of fabric

| Contents (Term Work) | | Hrs | Marks |
|---|---|---|---|
| **Unit -1** | **Scouring [06]**<br>01.03 Experimental Scouring of cotton, Wool, silk and other important textile fibres, yarns and fabrics. | **[06]** | |
| **Unit -2** | **Bleaching [06]**<br>01.04 Experimental Bleaching of cotton, Wool, silk and other important textile fibres, yarns and fabrics. | [06] | |
| **Unit -3** | **Dyeing [33]**<br>03.08 Familiarizing and sketching of various tools and machines used in wet processing.<br>03.09 Evaluation of inorganic and other substances used in textile processing like soda ash, bleaching powder, hydrogen peroxides, sodium sulphate, hydrosulphate,<br>03.10 Dying of three shades with direct dyes on cotton (0.5%, 0.8%, 1.2%, 1.5 %,)<br>03.11 Dying of three shades with basic dyes on cotton (0.5%, 1%, 1.3%, 1.5 %,)<br>03.12 Dying of three shades with basic dyes on silk, wool, (0.5%, 1.2%, 1.5%, 1.8 %,)<br>03.13 Dying of three shades with acid dyes on wool, silk (0.5%, 0.8%, 1.2%, 1.5 %,)<br>03.14 Dying of three shades with Sulphur dyes on cotton (0.5%, 0.8%, 1.2%, 1.5 %,)<br>03.08 After treatment given to direct colour and Sulphur colour dyed goods.<br>03.09 To study the effect of fine, temperature, concert ration of chemicals during dyeing . | [33] | |
| **Unit -4** | **Printing**<br>04.06 Practice of block printing on paper and fabrics (cotton, silk)<br>04.07 Preparation of designs for printing systems.<br>04.08 Printing paste preparation<br>04.09 Study the Roller printing machines and practice of them on fabric (cotton, silk)<br>04.10 Study the screen-printing constituents - screen table, screen, exposing unit, washing tray. | [15] | |
| | **Total-** | 60 | |

# COURSE UNDER MOOCS / SWAYAM / OTHERS (T.W)

| Subject Code 2028411 | Term Work | | | | | | Credits |
|---|---|---|---|---|---|---|---|
| | No. of Periods Per Week | | | Full Marks | : | 50 | 02 |
| | L | T | P/S | Internal Examiner | : | 15 | |
| | — | — | 04 | External Examiner | : | 35 | |