



BANGLADESH TECHNICAL EDUCATION BOARD

Agargaon, Dhaka-1207.

**4-YEAR DIPLOMA IN TEXTILE ENGINEERING CURRICULUM
COURSE STRUCTURE & SYLLABUS
(PROBIDHAN-2022)**

**APPAREL MANUFACTURING
TECHNOLOGY CODE: 14**

**5th SEMESTER
(Effective from 2023-2024 Academic Sessions)**

DIPLOMA IN TEXTILE ENGINEERING
COURSE STRUCTURE
PROBIDHAN-2022
APPAREL MANUFACTURING (14)

Apparel Manufacturing (14)

5th Semester

Sl. No.	Subject		Period		C	Marks Distribution						Grand Total
						Theory Assessment			Practical Assessment			
	Code	Name	T	P		Continuous	Final	Total	Continuous	Final	Total	
1	21151	Textile Testing & Quality Control-I	3	3	4	60	90	150	25	25	50	200
2	21251	Fabric Structure & Design	3	3	4	60	90	150	25	25	50	200
3	21351	Wet Processing-II	3	3	4	60	90	150	25	25	50	200
4	21451	Apparel Manufacturing-II	3	3	4	60	90	150	25	25	50	200
5	21452	Compliance in Textile industry	2	0	2	40	60	100	-	-	-	100
6	21861	General Maintenance & Utility Service	2	3	3	40	60	100	25	25	50	150
Total			16	15	21	320	480	800	125	125	250	1,050

DIPLOMA IN TEXTILE ENGINEERING
SYLLABUS
PROBIDHAN-2022
APPAREL MANUFACTURING (14)
FIFTH SEMESTER

Subject Code	Subject Name	Period Per Week		Credit
21151	Textile Testing & Quality Control - I	T	P	C
		3	3	4

Rationale	<p>This course is designed for the diploma in textile engineering students to learn about fibers, yarns and measuring techniques by using a variety of testing methodologies. The operating systems of various conventional and contemporary testing devices as well as the interpretation of testing data are other topics covered in this course. They can make decisions in the application sector with the use of these skills.</p>
Learning Outcome (Theoretical)	<p>After undergoing the subject, students will be able to:</p> <ul style="list-style-type: none"> ✓ Interpret testing, quality and quality control. ✓ Describe the atmospheric condition for textile testing. ✓ State fiber length, strength, fineness, maturity and neps measurement. ✓ Explain yarn counting system, yarn twist, yarn evenness and yarn faults.
Learning Outcome (Practical)	<p>After undergoing the subject, students will be able to:</p> <ul style="list-style-type: none"> ✓ Identify atmospheric condition for testing. ✓ Recognize different testing machines used to determine fibre and yarn properties. ✓ Identify different textile fiber by necessary testing. ✓ Demonstrate the principle of fiber length and fineness measurement. ✓ Perform the operational procedure of HVI and AFIS.

Detailed Syllabus (Theory)

Unit	Topics with Contents	Class (1 period)	Final Marks
1	Introduction to Textile Testing & Quality Control 1.1. Define Textile Testing. 1.2. Mention the objectives of textile testing. 1.3. Illustrate the importance of textile testing. 1.4. Define Quality Control. 1.5. Differentiate between process control and product control. 1.6. State the affecting factors on test results. 1.7. List the name of Fibre, yarn, grey fabric, dyed/printed fabric and apparel test.	3	6
2	Sampling Technique 2.1. Define sample and sampling. 2.2. State the necessity of sampling. 2.3. Describe the influencing factors of sampling method. 2.4. Discuss different sampling methods.	2	7
3	Identification of Textile Fibre 3.1. Explain the necessity of Fibre identification. 3.2. State the method of sample preparation for identification. 3.3. Explain burning method for fibre identification. 3.4. Explain microscopic method for fibre identification. 3.5. Explain chemical method for fibre identification.	3	6
4	Humidity & Moisture in Textile 4.1. Define humidity, Relative humidity, absolute humidity, standard atmospheric condition, testing atmospheric condition and conditioning of sample. 4.2. Define Moisture, Moisture regain and moisture content. 4.3. Relate between moisture regain and moisture content. 4.4. Discuss the effect of humidity on textile materials. 4.5. Describe the working principles of dry & wet bulb hygrometer. 4.6. State the factors affecting moisture regain of textile materials. 4.7. Discuss advantages and disadvantages of atmospheric condition on textile processing.	5	10
5	Fibre Length Measurement 5.1. Define Staple length and effective length. 5.2. Define mean length, modal length and span length. 5.3. Define Mean Length (ML) and Upper Half Mean Length (UHML) 5.4. Define floating Fibre percentage. 5.5. State uniformity index and uniformity ratio. 5.6. State the importance of fibre length. 5.7. Describe the methods of Fibre length measurement by comb sorter and digital fibro graph. 5.8. Describe the methods of Fibre length measurement by High Volume Instrument (HVI) and Advanced Fibre Information System (AFIS)	4	8

	machine.		
6	Fibre Fineness 6.1 Define Fibre fineness. 6.2 Define micronaire value. 6.3 Discuss the principle of fibre fineness measurement. 6.4 Discuss the importance of fibre fineness measurement. 6.5 Illustrate the working procedure of fibre fineness measurement by air flow method. 6.6 Mention the range of micronaire value for measuring the fibre fineness.	3	6
7	Fibre Strength Measurement 7.1 Define fibre strength. 7.2 State the importance of bundle Fibre strength. 7.3 Mention the factors influencing bundle Fibre strength. 7.4 Describe the working principle of bundle Fibre strength (Tenacity) measurement by Stelometer.	3	5
8	Fibre Maturity 8.1. Define fiber maturity. 8.2. Explain the importance of Fibre maturity. 8.3. Classify cotton fibre according to maturity. 8.4. Distinguish among matured, immature and dead fibre. 8.5. Discuss the maturity ratio measurement system. 8.6. Mention the range of maturity ratio.	3	6
9	Trash and Neps Measurement 9.1. Define trash, Neps & seed coat neps. 9.2. Discus the necessity of trash & neps measurement. 9.3. Describe the problems of neps on processing steps and products. 9.4. Interpret Shirley trash analyzer, High Volume Instrument (HVI) and Advanced Fibre Information System (AFIS). 9.5. Discuss color grading measurement system by High Volume Instrument (HVI).	3	6
10	Yarn Numbering System 10.1 Define yarn count. 10.2 State different yarn counting system with formula. 10.3 Mention different conversion formula related to yarn count. 10.4 Calculate relevant mathematical problems of yarn count. 10.5 Prepare a table of units of length and weight of different yarn numbering system. 10.6 List different instrument used for measuring yarn count. 10.7 Explain the method to find the count of plied/folded and cabled/cord yarn. 10.8 Describe the working principle of wrap reel & balance method for yarn count measurement. 10.9 Illustrate the principle of yarn count measurement by bezley's balance.	6	8

11	Twist in Yarn 11.1. Define yarn Twist Per Inch (TPI), Twist Per Meter (TPM) and Twist Per Centimetre (TPC). 11.2. Define Twist Multiplier (TM) and Twist Factor (TF). 11.3. State the measurement procedure of twist. 11.4. Discuss direction of twist (S and Z). 11.5. Interpret the effect of twist on yarn and fabric. 11.6. Describe the working principle of a modern twist measurement instrument.	3	4
12	Yarn Strength and Elongation 12.1. Define single yarn strength. 12.2. Illustrate measuring procedure of single yarn strength tester. 12.3. Define lea strength. 12.4. Define Count-Strength Product (CSP). 12.5. Define elongation percentage of single yarn. 12.6. State the factors affecting yarn strength and elongation.	3	6
13	Yarn Evenness and Imperfection 13.1. Define yarn evenness (U_m Percentage and CV_m Percentage) and imperfection (IPI). 13.2. Define yarn hairiness. 13.3. Describe the measuring principle of yarn evenness tester. 13.4. State the effects of hairiness on processing and fabric. 13.5. Discuss the principle of hairiness measurement.	4	6
14	Yarn Faults 14.1. Define seldom occurring fault. 14.2. Define frequent occurring fault. 14.3. Define classimat matrix. 14.4. Describe working principle of classimat. 14.5. Discuss measuring parameters of classimat.	3	6
	Total	48	90

Detailed Syllabus (Practical)

Sl.	Experiment Name with Procedure	Class (3 Period)	Continuous Marks
1	<p>Measure Humidity</p> <p>1.1. Identify the model, brand, origin and manufacturing year of wet and dry bulb hygrometer.</p> <p>1.2. Measure Relative Humidity (RH%) by wet and dry bulb hygrometer.</p> <p>1.3. Maintain the record of performed experiment.</p>	1	2
2	<p>Measure Moisture in Textiles</p> <p>2.1. Identify model, brand, origin and manufacturing year of oven and moisture meter.</p> <p>2.2. Measure moisture regain percentage of textile fibre by necessary instrument.</p> <p>2.3. Measure moisture content percentage of textile fibre by moisture meter.</p> <p>2.4. Maintain the record of performed experiment.</p>	1	3
3	<p>Identify Textile Fibre</p> <p>3.1. Identify the chemicals used for different fibres.</p> <p>3.2. Observe the specification of microscope.</p> <p>3.3. Detect the nature of fibres by burning method.</p> <p>3.4. Recognize cross-sectional and longitudinal view of textile fiber by microscope.</p> <p>3.5. Recognize fibres by chemical test.</p> <p>3.6. Maintain the record of performed experiment.</p>	2	2
4	<p>Determine Fibre Properties</p> <p>4.1. Collect specification from different machine.</p> <p>4.2. Measure fibre length by Comb Sorter.</p> <p>4.3. Detect fibre strength by Stelometer & High Volume Instrument (HVI).</p> <p>4.4. Test fibre fineness by The Wool Industries Research Association (WIRA) Fineness Meter & High Volume Instrument (HVI).</p> <p>4.5. Detect fibre maturity by NaOH & High Volume Instrument (HVI).</p> <p>4.6. Demonstrate trash measurement procedure by Shirley Trash Analyzer & High Volume Instrument (HVI).</p> <p>4.7. Maintain the record of performed experiment.</p>	3	4
5	<p>Count Neps</p> <p>5.1. Identify specification and modules of Advanced Fibre Information System (AFIS).</p> <p>5.2. Perform different set up for neps test of fibre, Lap/mat, sliver, mini lap and roving.</p> <p>5.3. Calculate Neps generation percentage (NGP) in Blowroom.</p> <p>5.4. Compute Neps Removal Efficiency (NRE) of carding and comber.</p> <p>5.5. Demonstrate counting procedure in Neps counter.</p> <p>5.6. Maintain the record of performed experiment.</p>	1	1

6	Identify Yarn Numbering System 6.1. Identify the wrap reel, electrical balance, Beesley balance and auto sorter machinery. 6.2. Determine the count of cotton, jute, wool, nylon, polyester yarn by Wrap reel & electronic balance, Beesley balance and Auto sorter. 6.3. Maintain the record of performed experiment.	2	3
7	Measure Yarn Twist 7.1. Recognize the specification of twist tester. 7.2. Observe the basic settings for twist tester. 7.3. Apply ordinary, semi-automatic and automatic twist tester. 7.4. Maintain the record of performed experiment.	1	2
8	Measure Yarn Strength and Elongation 8.1. Recognize the specification of single yarn strength tester, lea strength tester and tensile strength tester for jute. 8.2. Observe the basic settings for single yarn strength tester, tensile strength tester for jute and lea strength tester. 8.3. Demonstrate the testing procedure of Count Strength Product (CSP) and Quality Ratio (QR). 8.4. Maintain the record of performed experiment.	2	3
9	Perform Yarn Evenness and Imperfection Analysis 9.1. Collect specification of yarn evenness tester. 9.2. Observe the settings for sliver, roving and different count of yarn. 9.3. Demonstrate the testing procedure of sliver, roving and different count of yarn. 9.4. Conduct visual method by blackboard wrapping. 9.5. Maintain the record of performed experiment.	1	3
10	Perform Yarn Fault Analysis 10.1. Identify model, brand, origin and manufacturing year of classimat. 10.2. Demonstrate fault analysis from classimat. 10.3. Maintain the record of performed experiment.	1	2
	Total	16	25

Necessary Resources (Tools, equipment and Machinery):

Sl	Item Name	Quantity (Pieces)
01	Hygrometer	1
02	Oven	1
03	Moisture meter	1
04	Microscope	1
05	Chemicals for fibre identification HCl, H ₂ SO ₄ , Acidic acid, Formic Acid, Sodium Hydroxide, Acetone, Phenol.	
06	Comb Sorter	1
07	High Volume Instrument (HVI)	1
08	Stelometer	1
09	WIRA Fineness Meter	1
10	Shirley Trash Analyzer	1
11	Neps Counter	1
12	Advanced Fibre Information System (AFIS)	1
13	Wrap reel	1
14	Electronic balance	1
15	Beesley balance.	1
16	Auto Sorter	1
17	Ordinary Twist Tester	1
18	Semi-Automatic Twist Tester	1
19	Automatic Twist Tester	1
20	Single Yarn Strength Tester	1
21	Lea Strength Tester	1
22	Tensile Strength Tester for Jute	1
23	Yarn Evenness Tester	1
24	Black Board for Wrapping	1
25	Classimat Tester	1

Recommended Books:

Sl	Book Name	Writer Name	Publisher Name & Edition
01	Principles of Textile Testing	J.E. Booth	
02	Physical Testing of Textiles	B. P. Saville	
03	Handbook of Textile Testing and Quality Control	Grover, B. and Hemby, P.S.	Wiley Eastern Ltd., New Delhi, 2nd edition, 1988.
04	Introduction to Quality Control	Ishikawa Karou	
05	Textile Testing Fibre, Yarn and Fabric	Dr. Arindom Basu	

06	Manual for Textile Testing	The South India Textile Research Association. (SITRA)	
07	ঠUw÷s Ae ঠU·UvBj	Av. K. g. dwi`yj AvRv`	
08	ঠU·UvBj ঠUw÷s	BwÄwbqvi ঠgvt gwReyi ingvb	

Website Link:

<https://www.youtube.com/watch?v=LdEatXwFh0s>

<https://www.youtube.com/watch?v=sSZo9HejqDE>

<https://www.youtube.com/watch?v=tjorTddQtuU>

<https://www.youtube.com/watch?v=ot9LggjuzXc>

<https://www.youtube.com/watch?v=Jp55g6R8ihw>

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DIPLOMA IN TEXTILE ENGINEERING
SYLLABUS
PROBIDHAN-2022
APPAREL MANUFACTURING (14)
FIFTH SEMESTER

Subject Code	Subject Name	Period per Week		Credit
21251	Fabric Structure & Design	T	P	C
		3	3	4

Rationale	<p>Fabric is the primary completed product of textile industry which is used to produce various types of apparels and end use products. Therefore, diploma in textile engineers should have proper knowledge and skill about basic woven and knit fabrics. Fabric manufacturing studies are administered in two stages e.g. firstly, courses that are common to textile diploma holders, normally these courses are offered at the early stages of educations, and secondly, specialized courses which are offered for students who are expected to work in the various fabric manufacturing industries and these courses are collectively regarded as fabric manufacturing stream. The present course belongs the first category that is common to textile diploma holders. Apart from this, the course is a pre-requisite for the specialized courses on fabric manufacturing stream mentioned above. This course has been designed in such a way that the students will be able to analyze, identify and reproduce the basic woven and knit fabrics.</p>
Learning Outcome (Theoretical)	<p>After undergoing the subject, the students will be able to:</p> <ul style="list-style-type: none"> - Describe different types of woven fabric - Explain the main parts of a complete design - Illustrate different types of drafting system - Classify basic woven fabric - Design different types of basic woven fabric - Differentiate various types of basic woven fabric - Explain the end uses of various types of basic woven fabric - Describe basic weft knit fabrics - Design the chain notation, cam arrangement and needle arrangement of basic weft knit structure - Explain the end uses of basic knit structure.
Learning Outcome (Practical)	<p>After undergoing the subject, the students will be able to:</p> <ul style="list-style-type: none"> - Identify different types of basic woven fabric - Analyze different types of basic woven fabric - Produce various types of basic woven fabric - Determine the loom requirements for producing various types of basic woven fabric - Identify basic weft knit fabrics - Analyze basic weft knit fabrics - Produce basic weft knit fabrics - Determine the machine requirements for producing basic knit fabrics.

Detailed Syllabus (Theory)

Unit	Topics with Contents	Class (1 Period)	Final Marks
1	Introduction of Fabric Structure and Design <ul style="list-style-type: none"> 1.1 Define fabric structure 1.2 Classify fabric structure 1.3 Define fabric design 1.4 Define texture 1.5 Describe grain line of fabric 1.6 Define woven structure 1.7 Classify woven structure. 	2	5
2	Fundamentals of woven design <ul style="list-style-type: none"> 2.1 Explain different parts of a complete design 2.2 Describe the methods of fabric representation 2.3 Mention the conditions of repeat unit 2.4 Describe the identification process of warp and weft yarn 2.5 Define drafting 2.6 Classify drafting 2.7 Explain the methods of indicating drafts 2.8 Discuss various types of drafting systems 2.9 Discuss the basic weave of woven fabric. 	3	10
3	Plain weave <ul style="list-style-type: none"> 3.1 Define plain weave 3.2 Mention the features of plain weave 3.3 Classify plain cloth according to different approach 3.4 Describe the ornamentation process of plain weave 3.5 Discuss the end uses of plain weave. 	2	5
4	Derivatives of Plain weave <ul style="list-style-type: none"> 4.1 Describe the derivatives of plain weave 4.2 Define rib weave 4.3 Classify rib weave 4.4 Explain different types of rib weave with graph paper 4.5 Define matt weave 4.6 Classify matt weave 4.7 Explain different types of matt weave with graph paper 4.8 Distinguish between rib and matt weave 	4	10
5	Twill weave <ul style="list-style-type: none"> 5.1 Define twill weave 5.2 Mention the features of twill weave 5.3 Classify twill weave according to different points of view 5.4 Define angle of twill 5.5 List the derivatives of twill weave 	2	4

	5.6 Discuss the end uses of twill weave		
6	Zigzag and Herringbone twill 6.1 Define zigzag twill 6.2 Classify zigzag twill 6.3 Explain different types of zigzag twill with graph paper 6.4 Compare between horizontal and vertical zigzag twill 6.5 Define herringbone twill 6.6 Classify herringbone twill 6.7 Explain different types of herringbone twill with graph paper 6.8 Distinguish between horizontal and vertical herringbone twill.	4	4
7	Diamond and Diaper design 7.1 Define diamond design 7.2 Mention the features of diamond design 7.3 Illustrate the construction principle of diamond design 7.4 Construct diamond design with drafting and lifting plan 7.5 Define diaper design 7.6 State the features of diaper design 7.7 Illustrate the construction principle of diaper design 7.8 Construct diaper design with drafting and lifting plan 7.9 Differentiate between diamond and diaper design.	4	4
8	Broken twill and Rearranged twill 8.1 Define broken twill 8.2 Mention the features of broken twill 8.3 Explain the construction principle of various types of broken twill 8.4 Construct broken twill with drafting and lifting plan 8.5 Define rearranged twill 8.6 Mention the features of rearranged twill 8.7 Explain the construction principle of rearranged twill 8.8 Construct rearranged twill with drafting and lifting plan.	3	4
9	Stepped and elongated twill 9.1 Define stepped twill 9.2 Mention the features of stepped twill 9.3 Explain the construction principle of various types of stepped twill 9.4 Construct stepped twill with drafting and lifting plan 9.5 Define elongated twill 9.6 Mention the features of elongated twill 9.7 Explain the construction principle of various types of elongated twill 9.8 Construct elongated twill with drafting and lifting plan.	3	4
10	Combined Twill 10.1 Define combined twill	3	3

	<p>10.2 Mention the features of combined twill</p> <p>10.3 Explain the construction principle of warp way combined twill</p> <p>10.4 Construct warp way combined twill with drafting and lifting plan.</p> <p>10.5 Explain the construction principle of weft way combined twill</p> <p>10.6 Construct weft way combined twill with drafting and lifting plan.</p>		
11	<p>Shaded twill</p> <p>11.1 Define shaded twill</p> <p>11.2 Mention the features of shaded twill</p> <p>11.3 Explain the construction principle of single shaded twill</p> <p>11.4 Construct single shaded twill with drafting and lifting plan</p> <p>11.4 Explain the construction principle of double shaded twill</p> <p>11.6 Construct double shaded twill with drafting and lifting plan.</p>	2	3
12	<p>Satin and Sateen weaves</p> <p>12.1 Define satin weave</p> <p>12.2 Mention the features of satin weave</p> <p>12.3 Mention the classification of satin weave</p> <p>12.4 Define move number</p> <p>12.5 Describe the selection process of move number for satin weave</p> <p>12.6 Define regular and irregular satin weave</p> <p>12.7 Explain the construction process of satin weave with graph paper</p> <p>12.8 Explain the construction process of sateen weave with graph paper</p> <p>12.9 Discuss the end uses of satin weave.</p>	4	10
13	<p>Derivatives of satin weave</p> <p>13.1 Describe the derivatives of satin weave</p> <p>13.2 Discuss crepe weave</p> <p>13.3 Explain different methods of crepe weave production</p> <p>13.4 Explain the construction principle of odd number crotch screw weave with graph paper</p> <p>13.5 Explain the construction principle of single shaded satin weave with graph paper</p> <p>13.6 Explain the construction principle of double shaded satin Weave with graph paper.</p>	5	10
14	<p>Basic weft knitted structure</p> <p>14.1 Define knitted structure</p> <p>14.2 Mention the features of knitted structure</p> <p>14.3 Describe the classification of basic weft knitted structure</p> <p>14.4 Draw the chain notation of basic weft knitted structure</p> <p>14.5 Sketch the cam arrangement of basic weft knitted structure</p>	5	12

	14.6 Sketch the needle arrangement of basic weft knitted structure 14.7 Define GSM 14.8 Calculate GSM of basic knit fabric 14.9 Define stitch length 14.10 Explain the process of measuring stitch length.		
15	Typical export oriented fabrics 15.1 Explain typical export oriented fabrics 15.2 Mention the specification of Poplin, Voile, Chambray, Oxford, Canvas, Chiffon, Seer Sucker and Muslin Fabrics 15.3 Mention the specification of Denim, Gabardine, Fill-A-Fill, Ottoman And Panama Fabrics. 15.4 Mention the specification of Single jersey, Rib, Interlock, Lacoste, Pique, Waffle, Fleece fabrics.	2	2
	Total	48	90

Detailed Syllabus (Practical)

Unit	Topics with Contents	Class (3 Periods)	Continuous Marks
1	Observe plain fabric 1.1 Identify the face and back of the fabric 1.2 Identify warp and weft yarn 1.3 Determine the EPI and PPI. 1.4 Analyze the structure of the fabric 1.5 Draw the design of the fabric 1.6 Identify the repeating unit 1.7 Draw the drafting and lifting plan 1.8 Determine the loom requirements for producing the fabric 1.9 Maintain the record of performed experiment.	1	2.5
2	Observe rib fabric 2.1 Identify the face and back of the fabric 2.2 Identify warp and weft yarn 2.3 Determine the EPI and PPI. 2.4 Analyze the structure of the fabric 2.5 Draw the design of the fabric 2.6 Identify the repeating unit 2.7 Draw the drafting and lifting plan 2.8 Determine the loom requirements for producing the fabric 2.9 Maintain the record of performed experiment.	1	2.5
3	Observe matt fabric 3.1 Identify the face and back of the fabric 3.2 Identify warp and weft yarn 3.3 Determine the EPI and PPI.	1	2.5

	<p>3.4 Analyze the structure of the fabric</p> <p>3.5 Draw the design of the fabric</p> <p>3.6 Identify the repeating unit</p> <p>3.7 Draw the drafting and lifting plan</p> <p>3.8 Determine the loom requirements for producing the fabric</p> <p>3.9 Maintain the record of performed experiment.</p>		
4	<p>Observe twill fabric</p> <p>4.1 Identify the face and back of the fabric</p> <p>4.2 Identify warp and weft yarn</p> <p>4.3 Determine the EPI and PPI.</p> <p>4.4 Analyze the structure of the fabric</p> <p>4.5 Draw the design of the fabric</p> <p>4.6 Identify the repeating unit</p> <p>4.7 Draw the drafting and lifting plan</p> <p>4.8 Determine the loom requirements for producing the fabric</p> <p>4.9 Maintain the record of performed experiment.</p>	2	2.5
5	<p>Observe zigzag and herringbone design</p> <p>5.1 Identify the face and back of the fabric</p> <p>5.2 Identify warp and weft yarn</p> <p>5.3 Determine the EPI and PPI.</p> <p>5.4 Analyze the structure of the fabric</p> <p>5.5 Draw the design of the fabric</p> <p>5.6 Identify the repeating unit</p> <p>5.7 Draw the drafting and lifting plan</p> <p>5.8 Determine the loom requirements for producing the fabric</p> <p>5.9 Maintain the record of performed experiment.</p>	2	2.5
6	<p>Observe broken twill</p> <p>6.1 Identify the face and back of the fabric</p> <p>6.2 Identify warp and weft yarn</p> <p>6.3 Determine the EPI and PPI.</p> <p>6.4 Analyze the structure of the fabric</p> <p>6.5 Draw the design of the fabric</p> <p>6.6 Identify the repeating unit</p> <p>6.7 Draw the drafting and lifting plan</p> <p>6.8 Determine the loom requirements for producing the fabric</p> <p>6.9 Maintain the record of performed experiment.</p>	1	2.5
7	<p>Observe satin and sateen fabric</p> <p>7.1 Identify the face and back of the fabric</p> <p>7.2 Identify warp and weft yarn</p> <p>7.3 Determine the EPI and PPI.</p> <p>7.4 Analyze the structure of the fabric</p> <p>7.5 Draw the design of the fabric</p> <p>7.6 Identify the repeating unit</p> <p>7.7 Draw the drafting and lifting plan</p>	2	2.5

	7.8 Determine the loom requirements for producing the fabric 7.9 Maintain the record of performed experiment.		
8	Observe Plain knit fabric 8.1 Identify the face and back of the fabric 8.2 Identify courses and wales 8.3 Calculate the courses and wales per unit length 8.4 Calculate the stitch length 8.5 Determine the GSM of the fabric 8.6 Analyze the design of the fabric 8.7 Draw the chain notation, cam arrangement and needle arrangement of the supplied fabric sample 8.8 Maintain the record of performed experiment.	2	2.5
9	Observe 1x1 Rib knit fabric 9.1 Identify the face and back of the fabric 9.2 Identify courses and wales 9.3 Calculate the courses and wales per unit length 9.4 Calculate the stitch length and 9.5 Determine the GSM of the fabric 9.6 Analyze the design of the fabric 9.7 Draw the chain notation, cam arrangement and needle arrangement of the fabric 9.8 Maintain the record of performed experiment.	2	2.5
10	Observe 1x1 Interlock knit fabric 10.1 Identify the face and back of the fabric 10.2 Identify courses and wales 10.3 Calculate the courses and wales per unit length 10.4 Calculate the stitch length 10.5 Determine the GSM of the fabric 10.6 Analyze the design of the fabric 10.7 Draw the chain notation, cam arrangement and needle arrangement of the fabric 10.8 Maintain the record of performed experiment.	2	2.5
	Total	16	25

Necessary Resources (Tools, Equipment and Machinery):

Sl	Item Name	Quantity
01	Different woven fabric (Plain, rib, matt, twill, zigzag twill, herringbone twill, broken twill, satin and sateen)	50 yds./sample
02	Different knit fabric (Plain Single jersey, 1x1 rib, 1x1 interlock)	50 yds./sample
03	Counting glass/ Magnifying glass	50 pcs
04	Nipper	50 pcs
05	GSM cutter	5 pcs

06	GSM cutter board	5 pcs
07	Weighingbalance	5 pcs
08	Measuring Scale	50 pcs
09	Beesleysbalance	2 pcs
10	Measuring tape	50 pcs

Recommended Books:

SI	Book Name	Writer Name	Publisher Name & Edition
1	Watson's Textile Design	Z. Grosicki	
2	Watson's Textile Design & Colour	Nisbet	
3	Textile Weaving & Design	Z. Grosicki	
4	Woven Structure and Design Part-I	W.S. Murphy	
5	Fabric Structure and Design	N. Gokarneshan	
6	Understanding Textiles for a Merchandiser	Prof. Dr. Eng. Shah Alimuzzaman Belal	

Website References:

SI	Web Link	Remarks
1	https://nptel.ac.in/	
2	https://www.youtube.com/watch?v=nX0o4PHFoTY	Plain Single jersey fabric
3	https://www.youtube.com/watch?v=Ea_a-wuMtYE	Rib fabric analysis
4	https://www.youtube.com/watch?v=83JDEYeJkJM	Interlock fabric analysis

Team member

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DIPLOMA IN TEXTILE ENGINEERING
SYLLABUS
PROBIDHAN-2022
APPAREL MANUFACTURING (14)
FIFTH SEMESTER

Subject Code	Subject Name	Period Per Week		Credit
		T	P	
21351	WET PROCESSING II	3	3	C
		3	3	4

Rationale	Students pursuing a diploma in textile engineering must acquire fundamental expertise and skills in the overall process of wet processing, as well as dyes, chemicals, auxiliaries, and the operation of latest machine used in textile industry. Diploma textile engineers supervise dyeing, printing, finishing, and washing operations at the mid-level. They are also directly involved in the dyeing and printing processes. Most importantly, diploma textile engineers contribute significantly to the textile and apparel industries by achieving 80 percent foreign currencies. As a result, fundamental expertise and skills are required to study this subject. This subject has been included in this program to assist achieve these goals. This course focuses on overall wet processing and washing expertise.
Learning Outcome (Theoretical)	<p>After undergoing the subject, students will be able to:</p> <ul style="list-style-type: none"> - State the process sequence of wet processing - Classify the process sequence of wet processing machineries - Describe wet processing machinery and production procedure - Interpret the basic principles of wet processing - Explain the operations of wet processing as well as dyeing, printing, finishing and washing
Learning Outcome (Practical)	<p>After undergoing the subject, students will be able to:</p> <ul style="list-style-type: none"> - identify machineries involved in dyeing, printing, finishing and washing. - recognize components of dyeing, printing, finishing and washing items - observe process sequence of dyeing, printing, finishing and washing - observe wet processing machinery and their operations <ul style="list-style-type: none"> - calculate dyeing recipe as well as shade percentage by using data color

Detailed Syllabus (Theory)

Unit	Topics with Contents	Class (1 Period)	Final Marks
1	<p>Dyes/Dyestuffs and Dyeing of Textiles</p> <p>1.1 Define dye/dyestuffs</p> <p>1.2 Classify dyestuffs according to application</p> <p>1.3 State the common properties of dyestuffs</p> <p>1.4 Draw the process flow-chart of woven dyeing</p> <p>1.5 Draw the process flow-chart of knit dyeing</p> <p>1.6 Illustrate the theory of dyeing of textiles</p> <p>1.7 Describe the significance of lab dyeing, sample dyeing and bulk dyeing</p>	3	5
2	<p>DIRECT DYE</p> <p>2.1 Define direct dye</p> <p>2.2 Classify direct dye</p> <p>2.3 Mention the commercial name of direct dyes</p> <p>2.4 State the characteristics of direct dyes</p> <p>2.5 Describe the application of direct dyes on woven fabric</p> <p>2.6 Describe the application of direct dyes on knitted fabric</p> <p>2.7 State the after treatments and stripping of direct dyes</p>	3	10
3	<p>REACTIVE DYE</p> <p>3.1 Define reactive dye</p> <p>3.2 Classify reactive dyes</p> <p>3.3 Mention the commercial name of reactive dyes</p> <p>3.4 State the properties of reactive dyes</p> <p>3.5 Describe the application of reactive dyes on yarn</p> <p>3.6 Describe the application of reactive dyes on knitted fabric</p> <p>3.7 Describe the application of reactive dyes on woven fabric</p> <p>3.8 State the after-treatments and stripping of reactive dyes</p> <p>3.9 Mention the faults and remedies of dyeing with reactive dyes</p>	4	8
4	<p>DISPERSE DYE</p> <p>4.1 Define disperse dye</p> <p>4.2 Classify disperse dye</p> <p>4.3 Mention the commercial name of disperse dyes</p> <p>4.4 State the properties of disperse dyes.</p> <p>4.5 Describe the dyeing mechanism of disperse dyes</p> <p>4.6 Describe the application of disperse dyes on knitted fabric</p> <p>4.7 Describe the application of disperse dyes on woven fabric</p> <p>4.8 State the after-treatments and stripping of disperse dyes</p>	4	6

5	<p>SULPHUR DYES</p> <p>5.1 Define sulphur dye 5.2 Classify sulphur dye 5.3 State the characteristics of sulphur dyes 5.4 Describe the application of sulphur dyes on yarn 5.5 Describe the application of sulphur dyes on fabric 5.6 State after treatment of sulphur dyes 5.7 Mention the problems and remedies of dyeing with sulphur dyes</p>	3	6
6	<p>VAT DYE</p> <p>6.1 Define vat dye 6.2 Classify vat dye 6.3 Describe the properties of vat dyes 6.4 Describe vatting 6.5 Describe the application of vat dyes on yarn 6.6 Describe the application of vat dyes on fabric 6.7 State after-treatments of vat dyes</p>	4	7
7	<p>DYEING OF BLENDED FABRICS</p> <p>7.1 Define blended dyeing 7.2 Mention the objects of blended dyeing 7.3 State stages of blended dyeing 7.4 Mention the procedure of blended dyeing 7.5 Describe the dyeing procedure of polyester-cotton blended fabrics</p>	3	3
8	<p>TEXTILE PRINTING</p> <p>8.1 Define textile printing 8.2 Classify textile printing 8.3 Describe the styles and methods of textile printing 8.4 Mention the process flow-chart of textile printing 8.5 List out the ingredients used in textile printing 8.6 Define printing thickeners 8.7 Classify printing thickeners 8.8 Describe application of block and boutique printing on cotton fabric</p>	4	7
9	<p>PRINTING PROCESS</p> <p>9.1 Describe the printing of cotton fabric with Reactive dyes 9.2 Describe the printing of viscose fabric with Reactive dyes 9.3 Describe the printing of polyester fabric with Disperse dyes</p>	2	4

10	TEXTILE FINISHING 10.1 Define textile finishing 10.2 Mention the objectives of textile finishing 10.3 Classify textile finishing 10.4 Mention the process flow-chart of textile finishing 10.5 Differentiate between physical and chemical finishing of textiles 10.6 Illustrate the softener finishes on cotton fabric	4	7
11	K KNIT FINISHING 11.1 Mention the machines used in knit finishing 11.2 Illustrate the main components, functions and process parameters of hydro-extractor, de-watering, slitter 11.3 Describe the working procedure of stenter and compactor	2	5
12	DYEING MACHINERIES 12.1 Describe the requirements of dyeing machines 12.2 Mention the components and functions of a dyeing machine 12.3 Classify dyeing machine for textiles	2	5
13	TEXTILE PRINTING MACHINERIES 13.1 List the general machineries for textile printing 13.2 Describe the uses of rotary screen printing machine for textiles 13.3 Differentiate between flat bed and rotary screen printing machine. 13.4 Sketch screen, flock and transfer printing machine and mention essential components	3	5
14	TEXTILE FINISHING MACHINERIES 14.1 Mention machineries used in textile finishing 14.2 Illustrate the types of textile finishing machineries 14.3 Describe the finishing machineries for knitted fabric 14.4 Describe the finishing machineries for woven fabric. 14.5 State calendering process	3	5
15	GARMENTS DYEING AND WASHING 15.1 Define garments dyeing and washing 15.2 Define dry and wet process of denim washing 15.3 Mention the chemicals used for stone and enzyme wash 15.4 Describe the working procedure of stone-enzyme wash 15.5 Illustrate the types of denim wash 15.6 Differentiate between woven and knit washing process	4	7
	Total	48	90

Detailed Syllabus (Practical)

Serial	Experiment name with procedure	Class (3 Period)	Final Marks
1	<p>Observe dyeing lab machineries involved in wet process</p> <p>1.1 Identify the machinery involved in dyeing lab</p> <p>1.2 Observe the operations involved in dyeing lab</p> <p>1.3 Identify brand names, origin and capacity of dyeing, printing machineries involved in dyeing lab</p> <p>1.4 Maintain the record of performed experiment</p>	1	2
2	<p>Observe operation of dyeing machines</p> <p>2.1 Identify machinery involved in dyeing, printing, finishing, and washing.</p> <p>2.2 Perform the operations involved in dyeing, printing, finishing, and washing.</p> <p>2.3 Point out the brand names, origin and capacity of different dyeing machinery</p> <p>2.4 Maintain the record of performed experiment</p>	2	3
3	<p>Observe application of Reactive Dyes on Cellulosic Materials</p> <p>3.1 Select yarn and fabric for sample dyeing</p> <p>3.2 Prepare the stock solution for reactive dye</p> <p>3.3 Observe dyeing procedure of reactive dye</p> <p>3.4 Maintain the record of dyed samples.</p>	1	2
4	<p>Observe application of Direct Dyes on Cellulosic Materials</p> <p>4.1 Select yarn and fabric for sample dyeing</p> <p>4.2 Prepare stock solution for direct dye</p> <p>4.3 Observe dyeing procedure of direct dyes</p> <p>4.4 Maintain the record of dyed samples.</p>	2	3
5	<p>Observe application of Disperse Dyes on Polyester products</p> <p>5.1 Select yarn and fabric for sample dyeing</p> <p>5.2 Prepare the stock solution for dyeing</p> <p>5.3 Observe dyeing procedure of Disperse dye</p> <p>5.4 Maintain the record of dyed samples.</p>	2	2
6	<p>Prepare Thickener</p> <p>6.1 Identify various types of thickener used in textile printing process</p> <p>6.2 Observe preparation of thickener (Sodium Alginate, Fine Gum, Gum Arabic)</p> <p>6.3 Maintain the record of performed experiment</p>	1	3

7	<p>Observe Textile Printing Process</p> <p>7.1 Identify printing equipment (screen and flat-bed printing machine)</p> <p>7.2 Observe the printing Paste preparation</p> <p>7.3 Observe the printing process on cotton and polyester sample</p> <p>7.4 Observe the drying, steaming and curing process for printed samples</p> <p>7.5 Maintain the record of printed samples</p>	2	3
8	<p>Observe Calendering</p> <p>8.1 Sketch and identify different components of calendering machine</p> <p>8.2 Observe the operation of calendering</p> <p>8.3 Observe the effect of calendering on finished fabrics</p> <p>8.4 Maintain the record of performed experiment</p>	2	2
9	<p>Observe Garments Dyeing with Reactive and Direct Dye</p> <p>9.1 Observe the elements of garments dyeing</p> <p>9.2 Observe the procedure of garments dyeing (reactive and direct)</p> <p>9.3 Maintain the record of performed experiment</p>	2	3
10	<p>Observe Stone-Enzyme Wash</p> <p>10.1 Mention the machine used for stone-enzyme wash</p> <p>10.2 Identify the chemicals used in stone-enzyme wash</p> <p>10.3 Observe the procedure of stone-enzyme wash</p> <p>10.4 Maintain the record of performed experiment</p>	1	2
	Total	16	25

Necessary Resources (Tools, equipment and Machinery):

Sl	Item Name	Quantity (piece/s)
01	Sample Dyeing Machine	1
02	Data Color	1
03	Winch and Jigger dyeing machine	2
04	Hand blocks	20
05	Screen printing accessories	10
06	Dyes, Chemicals and Auxiliaries	
07	Boutique printing with accessories	10
08	Yarn, knitted and Woven Fabric	
09	Boiler and Steamer	1
10	Calendering machine	1

11	Stenter machine	1
12	Garments Dyeing and Washing Machine	2
13	Chemical Balance, Measuring cylinder, Pipette, Conical Flask and Beaker	2
14	p ^H Meter	10
15	Thermometer	10
16	Hand Iron	2
17	Hand Scissors	10
18	Screen Printing Table	2
19	Ozone Machine, Laser Machine, Woven Curing Machine	3

Recommended Books:

Sl	Book Name	Writer Name	Publisher Name & Edition
01	Related Books published by BTEB		
02	Dyeing and Chemical Technology of Textile Fibers	E.R Trotman	Fifth Edition Books Fair
03	Technology of Textile Process	Dr. V.A. Shenai	BMN-3 Foundation
04	Technology of Denim Manufacturing	Mr. Ershad Khan	Books Fair Publications
05	Basis Principle of Textile Coloration	Broadbent	Society of Dyes and Colourist
06	Practice of Textile Coloration (Volume-I)	Dr. M. ForhadHossain	Books Fair Publications
07	Textile Printing and Finishing	Mohammad ShahjahanFeroze	Gronthonir Publication

Website References:

Sl	Web Link	Remarks
01	https://www.youtube.com/watch?v=vc8e2wjmfwb	Textile Dyeing Basic Principle
02	https://www.youtube.com/watch?v=jRNqaOA8ZRI	Methods of Textile Printing
03	https://www.youtube.com/watch?v=UfuRugF86Ec	Denim Washing
04	https://www.youtube.com/watch?v=-BhzP-0Mha0	Textile Finishing
05	https://www.youtube.com/watch?v=sv9hNcOlq_E	Dyeing Floor
06	https://www.youtube.com/watch?v=LTKZ3xodx_g	Lab Dyeing

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DIPLOMA IN TEXTILE ENGINEERING
SYLLABUS
PROBIDHAN-2022
APPAREL MANUFACTURING (14)
FIFTH SEMESTER

Subject Code	Subject Name	Period perWeek		Credit
21451	Apparel Manufacturing-II	T	P	C
		3	3	4

Rationale	Textile Industry plays an important role in the GDP of Bangladesh. Textile engineers and diploma engineers are the main actors to run this sector. Around 80% foreign export earning is based on this sector. The apparel sector is contributing to create employment opportunity for the last three decades both in national and international arenas. The demand of skilled textile engineers is increasing gradually for smooth running this sector. Thus, diploma engineers should have proper knowledge of whole apparel manufacturing process. This course is the continuation of Apparel Manufacturing-I. Upon completion of this course the diploma textile engineers will acquire the fundamental knowledge, skill and attitude of apparel manufacturing processes containing sewing room operations, apparel finishing and inspection processes.
Learning Outcome (Theoretical)	After completion of this course, students will be able to: - Explain sewing room operation processes. - Describe apparel finishing processes. - Interpret apparel inspection systems.
Learning Outcome (Practical)	After completion of this course, students will be able to: - Identify the formation of stitch and seam. - Demonstrate different industrial sewing machine operations. - Make sample garments. - Prepare trim card.

Detailed Syllabus (Theory)

Unit	Topics with Contents	Class (1 Period)	Final Marks
1	Seam 1.1 Define seam. 1.2 Classify seam. 1.3 Describe different types of seam.	2	3
2	Stitch 2.1 Define stitch. 2.2 Classify stitch based on ISO. 2.3 Discuss ISO stitch class 100, 200, 300, 400, 500 and 600. 2.4 Explain the principle of lock stitch formation. 2.5 Explain the principle of chain stitch formation. 2.6 Compare lock stitch and chain stitch. 2.7 Discuss the principle of multi-thread chain stitch formation. 2.8 Explain the principle of hand stitch formation. 2.9 Describe the principle of overlock stitch formation. 2.10 Discuss the principle of covering chain stitch/ flat-lock formation.	5	10
3	Feed Mechanism 3.1 State the feed mechanism of sewing machine. 3.2 Describe the basic components of feed mechanism. 3.3 Classify feed mechanisms of sewing machine. 3.4 Discuss the drop feed system. 3.5 Explain differential bottom feed system. 3.6 Discuss adjustable top feed system. 3.7 Describe unison/ walking feed system. 3.8 Discuss needle feed system. 3.9 Explain puller feed system.	3	5
4	Sewing Needle 4.1 Discuss sewing needle. 4.2 Mention function of sewing needle. 4.3 Explain needle size/number. 4.4 Mention the classification of sewing needle. 4.5 Discuss the effect of wrong needle selection. 4.6 Describe different needle points. 4.7 Sketch needle cutting point and cloth point. 4.8 Explain needle cutting point and cloth point.	3	5
5	Sewing Thread 5.1 Define sewing thread. 5.2 Classify sewing thread.	3	5

	<p>5.3 Describe different sewing thread.</p> <p>5.4 Explain the factors affect the function of sewing thread.</p> <p>5.5 State different ticket number systems.</p> <p>5.6 Mention the features of a good quality sewing thread.</p> <p>5.7 Distinguish between yarn and sewing thread.</p> <p>5.8 Define thread finish.</p> <p>5.9 Mention the characteristics of thread finish.</p> <p>5.10 Describe different thread packages.</p>		
6	<p>Sewing Machine</p> <p>6.1 State sewing machine.</p> <p>6.2 List the types of sewing machine used in garments industry.</p> <p>6.3 Mention the features of lock stitch machine.</p> <p>6.4 State the characteristics of chain stitch machine.</p> <p>6.5 Discuss the characteristics of over lock machine.</p> <p>6.6 State the specification of zigzag lock stitch machine.</p> <p>6.7 State the specification of zigzag chain stitch machine.</p> <p>6.8 State the specification of flat lock machine.</p> <p>6.9 Mention the features of button hole machine.</p> <p>6.10 Mention the features of button attaching machine.</p>	5	10
7	<p>Components of Sewing Machine</p> <p>7.1 State the components of a sewing machine.</p> <p>7.2 Discuss the manually operated sewing machine.</p> <p>7.3 Discuss power-driven sewing machine.</p> <p>7.4 Distinguish between manually operated sewing machine and power-driven sewing machine.</p>	2	4
8	<p>Bed Types of Sewing Machine</p> <p>8.1 Classify bed types of sewing machine.</p> <p>8.2 Explain flat-bed sewing machine.</p> <p>8.3 Describe raised bed sewing machine.</p> <p>8.4 Explain post bed sewing machine.</p> <p>8.5 Describe cylinder bed sewing machine.</p> <p>8.6 Discuss feed of the arm bed sewing machine.</p> <p>8.7 Describe side bed sewing machine.</p>	2	4
9	<p>Sewing Faults</p> <p>9.1 List sewing faults.</p> <p>9.2 Explain causes of different sewing faults.</p> <p>9.3 Describe remedies of different sewing faults.</p> <p>9.4 Calculate sewing faults according to DHU.</p>	2	4
10	<p>Working Aids</p> <p>10.1 Define working aids.</p>	3	5

	<p>10.2 List the working aids.</p> <p>10.3 State the importance of working aids.</p> <p>10.4 Describe different types of working aids.</p>		
11	<p>Trimmings and Accessories</p> <p>11.1 Define trimmings and accessories.</p> <p>11.2 List the trimmings and accessories used in garments industries.</p> <p>11.3 Describe types of labels.</p> <p>11.4 Explain different international care label code.</p> <p>11.5 Differentiate between label and motif.</p> <p>11.6 Describe different interlining.</p> <p>11.7 Distinguish between sewn and fusible interlining.</p> <p>11.8 Differentiate between interlining and lining.</p> <p>11.9 Explain different types of button.</p> <p>11.10 Describe different types of zipper.</p>	4	8
12	<p>Pressing and Finishing</p> <p>12.1 Define finishing.</p> <p>12.2 State the necessities of thread cutting.</p> <p>12.3 Mention the objectives of pressing.</p> <p>12.4 Describe the categories of pressing.</p> <p>12.5 Mention the factors of pressing.</p> <p>12.6 List the different equipment of pressing.</p> <p>12.7 Discuss different pressing techniques.</p>	4	8
13	<p>Folding and Packing</p> <p>13.1 Define folding and packing.</p> <p>13.2 Classify folding.</p> <p>13.3 Describe different types of folding methods.</p> <p>13.4 Describe different types of packing.</p> <p>13.5 Discuss the methods of folding and packing.</p>	2	4
14	<p>Alternative Methods of Joining</p> <p>14.1 Define alternative method of joining of fabric.</p> <p>14.2 Classify alternative method of joining of fabric.</p> <p>14.3 Describe welding, molding, adhesing and rivet joining processes.</p> <p>14.4 Distinguish between sewing and alternative method of joining.</p>	3	5
15	<p>Apparel Inspection</p> <p>15.1 Define Inspection.</p> <p>15.2 State the objectives of inspection.</p> <p>15.3 Classify inspection.</p> <p>15.4 Describe pattern inspection, marker inspection, spreading inspection, cut-part inspection and packing inspection.</p> <p>15.5 Explain 1 or 2 hourly inspection, Traffic light system, 7-0 system of</p>	5	10

	inspection and Sewing End-line 100% inspections system. 15.6 Define AQL, DHU and TAP. 15.7 Discuss AQL final inspection procedure. 15.8 Explain different types of defects during inspection.		
	Total	48	90

Detailed Syllabus (Practical)

S.N.	Experiment name with procedure	Class (3 Period)	Continuous Marks
1	<p>Identify different Stitch classes</p> <p>1.1 Identify stitch class-100 from given sample/sketch. 1.2 Identify stitch class-200 from given sample/sketch. 1.3 Identify stitch class-300 from given sample/sketch. 1.4 Identify stitch class-400 from given sample/sketch. 1.5 Identify stitch class-500 from given sample/sketch. 1.6 Identify stitch class-600 from given sample/sketch. 1.7 Identify the machine needed for each class 1.8 Identify the appropriate number of needle, sewing thread and bobbin/looper thread in each stitch class from given sample/sketch. 1.9 Sketch the figure onto a A4 size paper. 1.10 Maintain the record of performed experiment.</p>	1	2
2	<p>Identify and Create different types of Seams</p> <p>2.1 Identify seam class-1 from given sample/sketch. 2.2 Identify seam class-2 from given sample/sketch. 2.3 Identify seam class-3 from given sample/sketch. 2.4 Identify seam class-4 from given sample/sketch. 2.5 Identify seam class-5 from given sample/sketch. 2.6 Identify seam class-6 from given sample/sketch. 2.7 Identify seam class-7 from given sample/sketch. 2.8 Identify seam class-8 from given sample/sketch. 2.9 Select appropriate folder to create each seam class. 2.10 Sketch the figure onto a A4 size paper. 2.11 Maintain the record of performed experiment.</p>	1	2
3	<p>Observe Specification and Practice Lock Stitch Sewing Machine</p> <p>3.1 Observe the Lock Stitch sewing machine for specification inscribed on machine. 3.2 Identify different parts of a Lock Stitch sewing machine. 3.3 Perform threading operation in needle of a Lock Stitch sewing machine. 3.4 Perform threading operation in bobbin of a Lock Stitch sewing machine. 3.5 Observe winding operation of bobbin on the bobbin. 3.6 Observe thread tension control point of a Lock Stitch sewing machine. 3.7 Observe Stitch Per Minute (SPM) control point of a Lock Stitch sewing machine. 3.8 Perform sewing operation. 3.9 Maintain the record of performed experiment.</p>	1	2
4	<p>Observe Specification and Practice Chain Stitch Sewing Machine</p> <p>4.1 Observe the Chain Stitch sewing machine for specification inscribed on machine. 4.2 Identify different parts of a Chain Stitch sewing machine.</p>	1	2

	<p>4.3 Perform threading operation in needle of a Chain Stitch sewing machine.</p> <p>4.4 Perform threading operation in looper of a Chain Stitch sewing machine.</p> <p>4.5 Observe thread tension control point of a Chain Stitch sewing machine.</p> <p>4.6 Observe Stitch Per Minute (SPM) control point of a Chain Stitch sewing machine.</p> <p>4.7 Perform sewing operation.</p> <p>4.8 Maintain the record of performed experiment.</p>		
5	<p>Observe Specification and Practice Over-Lock Sewing Machine</p> <p>5.1 Observe the Over-Lock sewing machine for specification inscribed on machine.</p> <p>5.2 Identify different parts of an Over-Lock sewing machine.</p> <p>5.3 Perform threading operation in needle of an Over-Lock sewing machine.</p> <p>5.4 Perform threading operation in lower and upper loopers of an Over-Lock sewing machine.</p> <p>5.5 Observe thread tension control point of an Over-Lock sewing machine.</p> <p>5.6 Observe Stitch Per Minute (SPM) control point of an Over-Lock sewing machine.</p> <p>5.7 Perform sewing operation.</p> <p>5.8 Maintain the record of performed experiment.</p>	2	2.5
6	<p>Observe Specification and Practice Flat-Lock Sewing Machine</p> <p>6.1 Observe the Flat-Lock sewing machine for specification inscribed on machine.</p> <p>6.2 Identify different parts of a Flat-Lock sewing machine.</p> <p>6.3 Perform threading operation in needle of a Flat-Lock sewing machine.</p> <p>6.4 Perform threading operation in lower loopers of a Flat-Lock sewing machine.</p> <p>6.5 Perform threading operation in spreader of a Flat-Lock sewing machine.</p> <p>6.6 Observe thread tension control point of a Flat-Lock sewing machine.</p> <p>6.7 Observe Stitch Per Minute (SPM) control point of a Flat-Lock sewing machine.</p> <p>6.8 Perform sewing operation.</p> <p>6.9 Maintain the record of performed experiment.</p>	2	2.5
7	<p>Observe Specification and Practice Fusing Machine</p> <p>7.1 Observe the fusing machine for specification inscribed on machine.</p> <p>7.2 Identify different parts of a fusing machine.</p> <p>7.3 Select appropriate setting based on interlining and fabric characteristics.</p> <p>7.4 Perform fusing operation.</p> <p>7.5 Maintain the record of performed experiment.</p>	2	3

8	Make a basic T-Shirt 8.1 Observe the sorted and bundled cut panel. 8.2 Perform break down the sewing operation according to panel joining. 8.3 Observe the joining of different panel. 8.4 Perform sewing operation according to break down. 8.5 Construct a complete T-shirt 8.6 Maintain the record of performed experiment.	2	3
9	Make a basic Pant 9.1 Observe the sorted and bundled cut panel. 9.2 Perform break down the sewing operation according to panel joining. 9.3 Observe the joining of different panel. 9.4 Perform sewing operation according to break down. 9.5 Construct a complete Pant. 9.6 Maintain the record of performed experiment.	2	3
10	Prepare Trim card 10.1 Observe the required components of a complete trim card. 10.2 Identify different trimmings of a given apparel/sample. 10.3 Identify different accessories of a given sample. 10.4 Put together all the trimmings and accessories to make a list. 10.5 Perform trim card preparation. 10.6 Maintain the record of performed experiment.	2	3
Total		16	25

Necessary Resources (Tools, Equipment and Machinery):

Sl	Item Name	Quantity (piece/s)
01	Different types of sewing machine folder	20 Pcs
02	Lock Stitch sewing machine	2 Pcs
03	Chain Stitch sewing machine	2 Pcs
04	Over-Lock sewing machine	2 Pcs
05	Flat-Lock sewing machine	2 Pcs
06	Fusing machine	2 Pcs
07	Hand Iron Machine	2 Pcs
08	Steam Iron Machine	2 Pcs
09	Needles	8 Packet
10	Sewing Thread Package (Cone)	44 Pcs
11	Bobbin	15 Pcs
12	Bobbin Case	15 Pcs
13	Trim Card (Paper)	200 Pcs
14	Different Types of Interlining	20 Yds
15	Scissors	8 Pcs
16	Thread Trimmer	8 Pcs
17	Velcro	20 Yds
18	Different Types of Elastic	5 Packet
19	Different Types of Button	200 Pcs

20	Different Types of Zipper	30 Pcs
21	Different Types of Label	20 Pcs
22	Different Types of Polybag	10 Pcs
23	Different Types of Carton	10 Pcs
24	Different Types of Hanger	10 Pcs
25	Different Types of Hand Tag	20 Pcs
26	Different Types of Price Ticket	20 Pcs
27	Different Types of Motif	20 Pcs
27	Different Types of Draw String	20 Yds

DIPLOMA IN TEXTILE ENGINEERING
SYLLABUS
PROBIDHAN-2022
APPAREL MANUFACTURING (14)
FIFTH SEMESTER

Subject Code	Subject Name	Period per Week		Credit
		T	P	
21452	Compliance in Textile Industry	2	0	2

Rationale	<p>Compliance has emerged as one of the most complex challenges before the Textile industry to stay competitive and relevant to emerging regulatory needs such as social, environmental and sustainability aspects.</p> <p>At the same time, ethical business is also growing significantly. If there is no compliance, then rights, health and safety issues will be vulnerable, and the business will be hampered. So law of the land, various international standards and buyers' code of conduct are mandatory parts of compliance.</p> <p>This module will equip students with the right knowledge related to compliance basics, local and international standards laws, code of conduct and conventions implementing ethical business in the industry as well as hands on experience on handling audits at the workplace. students will be learning via project , case studies assignment</p>
Learning Outcome (Theoretical)	<p>After undergoing the subject, students will be able to:</p> <ol style="list-style-type: none"> 1. Describe concept of compliance in textile industry. 2. Classify compliance related to Textile Industry. 3. Identify general and platform-based codes of conducts related to compliance in Textile Industry. 4. State the Laws and regulations related to compliance in the Textile Industry. 5. Identify safety, health, and welfare issues in the workplace. 6. Describe the grievance management system in textile industry. 7. Interpret different audits requirements related to compliance. 8. Perform internal audit and assist in external audit. 9. Monitoring and reporting requirements in Textile Industry. 10. Review best practices and areas for improvement in compliance Implementation in textile industry.

Detailed Syllabus (Theory)

Unit	Topics with Contents	Class (1 Period)	Final Marks
1	<p>INTRODUCTION TO COMPLIANCE</p> <p>1.1 Define compliance and basic pillars of compliance. 1.2 State necessity of compliance 1.3 State historical background of compliance in Bangladesh textile industry. 1.4 Describe evolution of compliance. 1.5 Define social compliance. 1.6 Define safety and security compliance. 1.7 Define environmental compliance. 1.8 Define technical compliance. 1.9 Explain compliance roles and responsibilities of the employer and employees in the textile industry. 1.10 Discuss customer and legislative requirements of compliance.</p>	2	4
2	<p>GENERAL CODE OF CONDUCT</p> <p>2.1 Explain general Code of Conduct (COC). 2.2 Describe the importance of general COC. 2.3 Classify the general Code of Conduct. 2.4 Mention the elements of general COC. 2.5 Mention the customer code of conduct. 2.6 Discuss implementation procedure based on customer code of conduct. 2.7 Mention government, Industry and customer policies related to compliance.</p>	2	4
3	<p>CERTIFICATION AND PLATFORM BASED CODE OF CONDUCT</p> <p>3.1 State the Platform based code of conduct. 3.2 State the certification-based code of conduct. 3.3 Explain Ethical Trading Initiative (ETI) base code. 3.4 Define ISO 9001 3.5 Define SA8000 by Social Accountability International. 3.6 Define Worldwide Responsible Accredited Production (WRAP). 3.7 Define Fair Labor Accreditation (FLA). 3.8 Define Customs Trade Partnership Against Terrorism (C-TPAT). 3.9 Define Business Social Compliance Initiative (BSCI). 3.10 Define Fair wear foundation.</p>	4	8

4	<p>COMPLIANCE LAW AND REGULATIONS</p> <p>4.1 Describe the ILO Convention 4.2 Define Bangladesh Labor Act 2006 4.3 Define Bangladesh Labor Rules 2015 4.4. Define Boiler Act 2013 of Bangladesh 4.5 State Bangladesh National Building Code (BNBC) 2022 4.6 Define Acid Control Act 2022 of Bangladesh 4.6 Define RSC guidelines.</p>	3	6
5	<p>OCCUPATIONAL SAFETY AND HEALTH (OSH)</p> <p>5.1 Define Occupational Safety and Health (OSH) in textile industry. 5.2 Mention the necessity and legal requirement of OSH in a textile industry. 5.3 Define working environment. 5.4 Identify the requirements of noise level and air emission. 5.5 Identify the requirements of light, temperature, and humidity in textile factory. 5.6 Define fire and electrical safety. 5.7 Define structural safety. 5.8 Define chemical safety. 5.9 Define loading and lifting safety. 5.10 Define housekeeping.</p>	4	8
6	<p>HIRA AND CONTROL MANAGEMENT</p> <p>6.1 Define hazard in workplace. 6.2 Identify different hazards in workplace. 6.3 Define risk in workplace. 6.4 Identify different risks in workplace. 6.5 Discuss Hazard Identification and Risk Assessment (HIRA) 6.6 Compare between risk and hazard. 6.7 Calculate risk Matrix. 6.8 Evaluate risk and acceptability of risk. 6.9 Apply control measures to reduce hazard and risk.</p>	3	6
7	<p>WELFARE</p> <p>7.1 Define welfare facilities in workplace. 7.2 Describe Pure Drinking water facilities in workplace. 7.3 Discuss toilets, wash, and spittoon box facilities in workplace. 7.4 Describe First Aid Box, Medical Center, Medical cupboard and Doctors and Nurses facilities in workplace. 7.5 Describe Canteen, Dining and Rest room facilities in workplace.</p>	4	8

	7.6 Describe Childcare facilities in workplace. 7.7 Describe Maternity facilities in workplace. 7.8 Discuss Insurance and central funds in workplace. 7.9 Define the roles and responsibilities of welfare officer.		
8	COMPLIANCE AUDIT AND REPORTING IN TEXTILE INDUSTRY 8.1 Define audit. 8.2 Differentiate between internal and external audit. 8.3 Describe the process to conduct audit in textile industry. 8.4 Prepare audit Plan and checklist. 8.5 Define general behavior of auditor and auditee. 8.6 Conduct audit. 8.7 Describe Monitoring and Follow-up procedure after audit.	6	10
9	GRIEVANCE MANAGEMENT 9.1 Define Grievance. 9.2 Classify grievances in workplace. 9.3 Describe roles and responsibilities of grievance management committee. 9.4Mention steps in the grievance handling procedure. 9.5State different ways of raising grievance. 9.6Discuss the function of trade union and a participatory committee in the	2	4
10	BEST PRACTICES ON COMPLIANCE IMPLEMENTATION 10.1 Identify best practices to implement compliance in textile industry. 10.2 Define ethical business and responsible business practices in the textile industry. 10.3 Describe current trends in compliance management.	2	2
		32	60

Necessary Resources (Tools, equipment's, and Machinery):

SI	Item Name	Quantity
01	Sample of Buyer 's Policy	One for each student
02	Code of conduct sample	One for each student
02	Case studies and assignment related documents	One for each student
03	Project template	One for each student
04	Audit checklist	One for each student

Recommended Books:

SI	Book Name	Writer Name	Publisher Name & Edition
1	Industrial Safety and Health Management	Asfahl, C. Ray	Upper Saddle River, New Jersey: Prentice-Hall, (2003)
2	Handbook of chemical health and safety	Alaimo, R. J.	Washington D.C.: American Chemical Society (2001)
3	Basics of Industrial Hygiene	Nims, D	John Wiley & Sons, New York (1999)
4	Chemical Management System Guidance Manual 2015	Zero Discharge of Hazardous Chemicals Group	
5	GIZ Chemical Management Toolkit	GIZ	
6	Bangladesh Labour Rules 2015		
7	Labor and Industrial Laws of Bangladesh	A.K.K. Nasim	ReMISi Publishers
8	Social Responsibility of Engineers. International Journal of Academic Research and Development. Vol. 03	Godhade, J. B., and S.T. Hunderkari	Special Issue. March, 2018
9	Engineers, Society and Sustainability. Synthesis Lectures on Engineers, Technology, and Society	Bell, S. Edited by Caroline Baillie	University of Western Australia
10	A Philosophy of Technology: From Technical Artefacts to Socio technical systems	Pieter Vermaas, Peter Kroes, Ibo Poel, Maarten Franssen, Wybo Houkes	Springer Cham, 2011
11	The Social Functions of Engineering: A Current Assessment, a Chapter in "Engineering as a Social Enterprise	Bugliarello, G.	https://nap.nationalacademies.org/read/1829/chapter/10
12	Textile coloration with natural colorants: A review, Journal of Cleaner Production, Vol 349	MA Uddin et al	https://www.sciencedirect.com/science/article/abs/pii/S0959652622011106?via%3Dihub

13	Sustainable Industrial Design and Waste Management -Green Chemistry in Cleaner Production Technologies and Tools for Resource Efficient Production	Dr.Salah M. El-Haggar PE, PhD, in Sustainable Industrial Design and Waste Management, 2007	Elsevier 2007
14	Chapter 4: Principles of Green Chemistry	Paul T. Anastas and John C. Warner	
15	Chapter 2: Principles of Sustainable and Green Chemistry in Handbook of Green Chemistry and Technology	Mike Lancaster	
16	Wastewater Engineering: Treatment and Resource Recovery	Metcalf and Eddy	2014
17	Manual for sludge management in Bangladesh Textile sector	Uddin, M. A., and S. Ahmed	2016
18	Chemical Process Safety: Fundamentals with application	Crowl, A. Daniel, and Luvar	2011
19	Handbook of chemical health and safety	Alaimo, R. J.	American Chemical Society 2001
20	World Health Organisation, International Programme on Chemical Safety		
21	Sustainable Innovations in Textile Chemistry and Dyes	S. S. Muthu (ed) (2014)	Springer
22	Best Available Techniques (BAT) Reference Document for the Production of Large Volume Organic Chemicals	HeinoFalcke, Simon Holbrook, Iain Clenahan, Alfredo López Carretero, TeomanSanalan, Thomas Brinkmann, Joze Roth, Benoit Zerger, Serge Roudier, Luis Delgado Sancho	EUR 28882 EN; Publications Office of the European Union, Luxembourg, 2017
23	Environmental, Health, and Safety Guidelines for Textile Manufacturing	IFC	
24	Doing business in Bangladesh by HSBC	HSBC	
25	Commercial law, including Company Law	Arun Kumar Sen and Jitendra Kumar Mitra	

27	The Contract Act, Dhaka Law Reports	Esrarul Huq Chowdhury, Partnership Act-19323	
28	The Legal Environment of Business_ A Managerial Approach_ Theory to Practice	Sean P.Melvin, McGraw-Hill Irwin	

Website References:

Sl	Web Link	Remarks
1	http://dx.doi.org/10.1016/j.jclepro.2022.131489	
2	https://www.tuvsud.com/en-sg/industries/consumer-products-and-retail/textile-and-clothing	
3	https://www.roadmaptozero.com/fileadmin/layout/media/downloads/en/CMS_EN.pdf	
4	http://www.dol.gov.bd/site/view/legislative_information/	
5	https://youtu.be/fZ1gQTgPGR0	
6	chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://betterwork.org/wp-content/uploads/2020/01/Bangladesh-Annual-Report_2.pdf	
7	https://www.ecocert.com/en-IN/certification	
8	https://textilefocus.com/brief-certifications-required-textile-industry/	
9	https://www.fibre2fashion.com/industry-article/3746/iso-certification-for-textile-and-apparel-industries	
10	https://www.manufacturingmanagement.co.uk/features/what-certifications-are-important-for-the-garment-industry	
11	https://certifications.controlunion.com/en/industries/textiles	
12	https://sa-intl.org/programs/sa8000/	

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Recommended Books:

SI	Book Name	Writer Name	Publisher Name and Edition
01	An introductory knowledge about garment manufacturing technology	Abu Nafiz, Md. Saiful Azam, Md. Abu Saleh.	Books Fair, 2 nd Edition
02	Garments and Technology	M. A. Kashem	Granthonir Prokashoni, 3 rd Edition
03	Technology of Clothing Manufacture	Carr and Latham	Wiley, 2 nd Edition
04	Cooklin's Garment Technology for Fashion Designers	Steve Hayes, John McLoughlin and Dorothy Fairclough	Blackwell Publishing, Fourth Edition

Website References:

SI	Web Link	Remarks
01	https://www.youtube.com/c/VisualLearningwithMazhar	
02	https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=827	
03	https://www.youtube.com/c/Vidyamitra/playlists	

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DIPLOMA IN TEXTILE ENGINEERING
SYLLABUS
PROBIDHAN-2022
APPAREL MANUFACTURING (14)
FIFTH SEMESTER

Subject Code	Subject Name	Period Per Week		Credit
21861	General Maintenance & Utility Service	T	P	C
		2	3	3

Rationale	Students need to gather basic knowledge and skill on the overall process of the maintenance machinery, mainly hand tools, power tools, other equipment, safety maintenance and utility machinery such as boilers, generators, pumps, motors and transformers. Fundamental knowledge and skills are prerequisites to maintenance of textile machinery and equipment. This subject covers the overview of general maintenance and utility of textile industry.
Learning Outcome (Theoretical)	<p>After undergoing the subject, students will be able to:</p> <ul style="list-style-type: none"> ➤ Describe various types of basic maintenance. ➤ Explain hand tools and power tools for maintenance. ➤ State different lubricants and lubrication. ➤ Explain the bearing, bush and shaft. ➤ Describe pump and boiler. ➤ Explain different types of motors, generators and transformers. ➤ Describe power transmission system. ➤ Explain air-conditioning and humidification
Learning Outcome (Practical)	<p>After undergoing the subject, students will be able to:</p> <ul style="list-style-type: none"> ➤ Identify the various maintenance tools and equipment. ➤ Identify the various lubricants for lubrication ➤ Calculate the power transmission system. ➤ Perform the operation of boilers, pumps, motors and generators ➤ Identify the boiler mountings and accessories ➤ Operate the central air conditioning system.

Detailed Syllabus (Theory)

SL No.	Topics with Contents	Class (1 Period)	Final Marks
1	GENERAL CONCEPT OF MAINTENANCE 1.1 Define maintenance. 1.2 Mention the Importance of maintenance. 1.3 Discuss different types of maintenance. 1.4 Explain different steps of maintenance. 1.5 Explain the cleaning procedure in maintenance.	2	4
2	MAINTENANCE TOOLS, REPAIRING AND OVERHAULING 2.1 Define the tools and equipment. 2.2 Discuss different types of tools and equipment. 2.3 Mention the list of general tools used in maintenance. 2.4 Explain repairing and overhauling. 2.5 Discuss the advantages and disadvantages of repairing. 2.6 Differentiate between repairing and overhauling.	3	6
3	CONCEPT OF POWER TRANSMISSION SYSTEM 3.1 Define power transmission. 3.2 Discuss different types of power transmission. 3.3 Discuss different types of pulleys. 3.4 Describe different types of belts. 3.6 Mention the advantages and disadvantages of belt drive. 3.7 Describe different types of gear and gear trains. 3.8 Explain the nomenclature of gear.	4	8
4	BEARING, BUSH AND SHAFT 4.1 Define bearing, bush and shaft. 4.2 Describe functions of bearing. 4.3 Describe different types of bearing. 4.4 Mention the functions of bush. 4.5 Discuss different types of shafts.	3	4
5	LUBRICANT AND LUBRICATION 5.1 Define lubricant and lubrication. 5.2 Discuss the functions of lubricant. 5.3 Describe types of lubrication. 5.4 Describe the lubrication processes. 5.5 Mention the properties of a good lubricant. 5.6 List different types of lubricants.	2	4
6	BOILER 6.1 Define boiler. 6.2 Classify boiler. 6.3 Discuss Boiler mountings and boiler accessories. 6.4 Classify boiler. 6.5 Describe working principle of boiler. 6.6 Explain boiler blow down and boiler scaling. 6.7 Discuss boiler efficiency. 6.8 Mention the utility of boiler.	4	10

7	PUMP AND COMPRESSOR 7.1 Define pump and compressor. 7.2 Mention the necessity of pump and compressor. 7.3 Classify pump and compressor. 7.4 Describe the working principle of centrifugal, reciprocating and rotary pump. 7.5 Mention the uses of compressors in textiles. 7.6 Illustrate centrifugal compressor. 7.7 Discuss reciprocating compressor.	3	3
8	REFRIGERATION AND AIR CONDITIONING 8.1 Define refrigeration and air conditioning systems. 8.2 Discuss different types of air-conditioning systems. 8.3 Discuss important components of refrigeration. 8.4 Describe working principle of central air conditioning system. 8.5 Discuss the main components of chiller. 8.6 Define humidification. 8.7 Mention the importance of humidification.	4	8
9	MOTOR, GENERATOR AND TRANSFORMER 9.1 Define motor, generator and transformer. 9.2 Mention types of motors, generators and transformers. 9.3 State the functions of motor and transformer. 9.4 State the main parts of generator. 9.5 Describe the working principle of generator. 9.6 Describe generator capacity.	4	8
10	SAFETY MAINTENANCE AND SCHEDULING 10.1 Discuss safety measures in maintenance. 10.2 Mention the importance of safety in maintenance. 10.3 Discuss the different types of safety devices. 10.4 State the safety rules of maintenance. 10.5 Define schedule maintenance. 10.6 State the work plan and weekly worksheet. 10.7 State the machine card and maintenance ledger. 10.8 Explain breakdown report. 10.9 State the lubrication control chart.	3	5
		32	60

Detailed Syllabus (Practical)

SL No.	Topics with Contents	Class (3 Period)	Continuous Marks
1	OBSERVE GENERAL TOOLS FOR MAINTENANCE 1.1 Observe the hand tools for maintenance. 1.2 Sketch the different types of hand tools. 1.3 Identify different types of hand tools. 1.4 Observe the operation of hand tools. 1.5 Maintain the record of performed experiment.	2	2.5

2	SELECT LUBRICANTS FOR LUBRICATION 2.1 Identify lubrication tools. 2.2 Identify lubricator. 2.3 Select lubricants. 2.4 Maintain the record of performed experiment.	1	2.5
3	DEMONSTRATE LUBRICATION IN GEAR 3.1 Identify lubrication tools. 3.2 Identify gear. 3.3 Select the lubricant 3.4 Observe precautions in lubrication. 3.5 Maintain the record of performed experiment.	2	2.5
4	OBSERVE THE CENTRIFUGAL PUMP AND COMPRESSOR 4.1 Identify parts of centrifugal pump. 4.2 Sketch the centrifugal pump. 4.3 Demonstrate the operation of centrifugal pump. 4.4 Illustrate centrifugal compressor. 4.5 Recognize the use of compressors in textiles. 4.6 Maintain the record of performed experiment.	2	2.5
5	DEMONSTRATE PARTS OF BOILER 5.1 Identify boiler mountings and accessories. 5.2 Sketch boiler mountings and accessories 5.3 Observe operation of boiler mountings and accessories. 5.4 Calculate boiler efficiency and equivalent evaporation 5.4 Maintain the record of performed experiment.	2	2.5
6	OPERATE GENERATOR 6.1 Observe the main parts of generator. 6.2 Sketch the main parts of generator. 6.3 Perform operation of generator. 6.4 Maintain the record of performed experiment.	1	2.5
7	OBSERVE AIR CONDITIONING SYSTEM 7.1 Draw the vapor compression refrigeration system. 7.2 Sketch main components of refrigeration. 7.3 Identify the main components of chiller. 7.4 Identify duct, AHU, FCU, and piping of central air-conditioning. 7.5 Maintain the record of performed experiment.	2	2.5
8	OPERATE MOTOR 8.1 Identify the main parts of motor. 8.2 Perform operation of motor. 8.3 Demonstrate the functions of motor. 8.4 Perform megger test of motor. 8.5 Maintain the record of performed experiment.	2	2.5
9	OBSERVE TRANSFORMER 9.1 Observe transformer. 9.2 Calculate transformer capacity. 9.3 Identify the functions of transformer. 9.4 Maintain the record of performed experiment.	1	2.5

10	PREPARE WORK PLAN FOR TEXTILE MILL MANAGEMENT	1	2.5
	10.1 Identify maintenance machinery 10.2 Identify machinery for repairing 10.3 Identify machinery for overhauling 10.4 Prepare datasheet 10.5 Maintain the record of performed experiment.		
	Total	16	25

Necessary Resources (Tools, Equipment and Machinery):

SL	Item Name	Quantity (piece/set/L)
01	Hand Grinding Machine	4
02	Pedestal Grinding Machine	1
03	Hand drill Machine	2
04	Hacksaw Frame	12
05	Vernier Calipers	10
06	Tap Set	2
07	Die Set	2
08	Drill bit Set	2
09	Parallel bar Set	2
10	Surface Gauze	2
11	Vernier Height Gauze	2
12	Dial Indicator	2
13	Pipe Die	2
14	Wrench Slide	10
15	Oil can	10
16	Oil pump	5
17	Grease gun	10
18	Air mist lubricator	1
19	Force feed lubricator	1
20	Motor	2
21	Pump	2
22	Gear	10
23	Pully	10
24	Blower machine	5
25	Lubricant	1
26	Boiler	1
27	Micrometer	10
28	Pipe wrench	5
29	Bush	10
30	Bearing	10
31	Chiller unit	1
32	Duct	5
33	Viscosity meter	5

Recommended Books:

SL No.	Book Name	Writer Name	Publisher Name & Edition
01	Related Books published by BTEB		
02	Theory of Machinery	RS Khurmi	
03	Pumps and Compressors	Marc Borremans	
04	Hydraulics and Hydraulic Machinery	Dr. R. K. Bansal	
05	Fluid Mechanics	C. Potter	
06	Principle of Power system	VK. Mehtha	
07	Power Plant Engineering	GR. Nagpal	

Website References:

SL No.	Web Link	Remarks
01	https://www.youtube.com/@Lesics	
02	https://www.youtube.com/@EngineeringMindset	
03	https://nptel.ac.in/	
04	https://textilelearner.net/	
05	https://bunon.info/	

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