Program Name	: Diploma in Fashion and Clothing Technology
Program Code	: DC
Semester	: Second
Course Title	: Basics of Textile Manufacture
Course Code	: 22234

1. RATIONALE

Knowledge about raw material is very important in area of Fashion Design and Clothing Technology. A fashion technologist should have a basic knowledge about fiber, yarn and fabric. Students of diploma course must know the process sequence in spinning and weaving departments of textile manufacturing. They should be aware of the various quality and process parameters and also be able to produce quality fabric. This course aims at development of relevant competency in the area of textile manufacturing.

2. COMPETENCY

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- **Apply principles of yarn and fabric manufacturing process to produce plain woven fabric.**

3. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following *industry oriented* COs associated with the above mentioned competency:

- a. Use the basic principles of pre-opening when producing yarns.
- b. Apply the principles of spinning when producing yarn.
- c. Use the yarn numbering system to estimate the yarn size.
- d. Select relevant preparatory process for producing fabric.
- e. Apply the principle of interlacement when producing plain woven fabric.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme			Credit (L+T+P)	Examination Scheme														
					Theory						Practical							
L	T	P		Paper Hrs.	ESE		PA		Total		ESE		PA		Total			
					Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min		
3	-	2	5	3	70	28	30*	00	100	40	25@	10	25	10	50	20		

(*): Under the theory PA, Out of 30 marks, 10 marks are for micro-project assessment to facilitate integration of COs and the remaining 20 marks is the average of 2 tests to be taken during the semester for the assessment of the UOs required for the attainment of the COs.
***Legends:** L-Lecture; **T** – Tutorial/Teacher Guided Theory Practice; **P** - Practical; **C** – Credit, **ESE** - End Semester Examination; **PA** - Progressive Assessment*

5. COURSE MAP (with sample COs, PrOs, UOs, ADOs and topics)

This course map illustrates an overview of the flow and linkages of the topics at various levels of outcomes (details in subsequent sections) to be attained by the student by the end of the course, in all domains of learning in terms of the industry/employer identified competency depicted at the centre of this map.
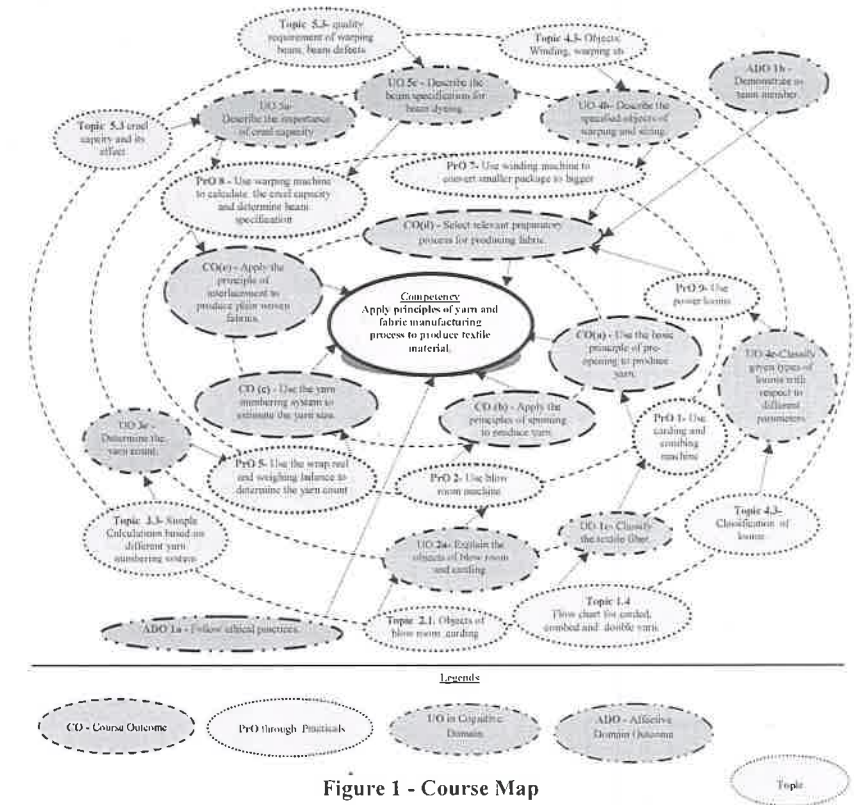

Figure 1 - Course Map

6. SUGGESTED PRACTICALS/ EXERCISES

The practicals in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency.

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
1	Use carding machine for given task.	I	02
2	Use combing machine for given task.	I	02
3	Use blow room machine for given task.	II	02
4	Use draw frame machine for given task.	II	02
5	Use fly frame machine for given task.	II	02
6	Use ring frame machine for given task.	II	02
7	Use the wrap reel and weighing balance to determine the yarn count.	III	02
8	Use fabric sample to determine warp and weft direction in given fabric sample.	IV	02
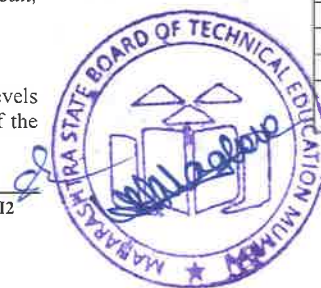
S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
9	Use fabric sample to determine the end per inch and picks per inch.	IV	02
10	Use winding machine to convert smaller package to bigger package.	IV	02
11	Use warping machine to prepare raw material for next process.	V	02
12	Use warping machine to determine the creel capacity and determine beam specification.	V	02
13	Use power looms to correlate the principles of fabric manufacturing. (Part -I)	IV,V	02
14	Use power looms to correlate the principles of fabric manufacturing. (Part -II)	IV,V	02
15	Use multi-colored warp and weft fabric to calculate crimp percentage, warp and weft count, cover factor.	VI	02
16	Determine warp and weft color repeat	VI	02
	Total		**32**

Note

i. *A suggestive list of PrOs is given in the above table. More such PrOs can be added to attain the COs and competency. A judicial mix of minimum 12 or more practical need to be performed, out of which, the practicals marked as '*' are compulsory, so that the student reaches the 'Precision Level' of Dave's 'Psychomotor Domain Taxonomy' as generally required by the industry.*

ii. *The 'Process' and 'Product' related skills associated with each PrO is to be assessed according to a suggested sample given below:*

S. No.	Performance Indicators	Weightage in %
1	Preparation of experimental set up	20
2	Setting and operation	20
3	Safety measures	10
4	Observations and Recording	10
5	Interpretation of result and conclusion	20
6	Answer to sample questions	10
7	Submission of report in time	10
	Total	**100**

The above PrOs also comprise of the following social skills/attitudes which are Affective Domain Outcomes (ADOs) that are best developed through the laboratory/field based experiences:

    a. Follow safety practices.
    b. Practice good housekeeping.
    c. Demonstrate working as a leader/a team member
    d. Maintain tools and equipment.
    e. Follow ethical practices.

The ADOs are not specific to any one PrO, but are embedded in many PrOs. Hence, the acquisition of the ADOs takes place gradually in the student when s/he undertakes a series of practical experiences over a period of time. Moreover, the level of achievement of the ADOs according to Krathwohl's 'Affective Domain Taxonomy' should gradually increase as planned below:

- 'Valuing Level' in 1st year
- 'Organising Level' in 2nd year and
- 'Characterising Level' in 3rd year.

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of experiments, as well as aid to procure equipment by authorities concerned.

S. No.	Equipment Name with Broad Specifications	Exp. No.
1	Ten different fabrics with different ends and picks per inch.	1,6
2	Counting glass ,needle, steel ruler	2
3	Winding machine	2
4	Warping machine	3
5	Power looms	4
6	Wrap reel and weighing balance	5
7	Blow room machine	7
8	Carding and combing machine	8
9	Draw frame, fly frame and ring frame machine	9,10

8. UNDERPINNING THEORY COMPONENTS

The following topics/subtopics are to be taught and assessed in order to develop UOs for achieving the COs to attain the identified competency.

Unit	Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
	Spinning	
Unit – I Pre-opening	1a. Explain cultivation process for the given textile fiber. 1b. Describe the objects of pre-opening for the given fiber. 1c. Classify the given textile fibers. 1d. Sketch the process flow chart for the specified type of yarn.	1.1 Cotton fiber cultivation and picking 1.2 Pre cleaning: objects of pre ginning and ginning, Dimensions of bale, Objects of pressing. 1.3 Textile fiber: definition, Essential properties and classification. 1.4 Flow chart for carded, combed and double yarn.
Unit– II Yarn Spinning	2a. Explain the specified purpose of blow room and carding. 2b. Explain the specified objects of comber and speed frame. 2c. Distinguish the features of the given types of yarns. 2d. Describe the effects of given yarn parameters for the spinning process.	2.1 Purpose of blow room, carding, draw frame, sliver lap and ribbon lap, comber, speed frame, ring frame 2.2 Classification of Yarn: single yarn, double yarn, staple yarn, hosiery yarn, open end yarn, ring yarn, air jet yarn, dref yarn. 2.3 Yarn parameter: Strength, Elongation, maturity, yarn count, hairiness, evenness.
Unit– III Yarn	3a. Explain the specified yarn numbering system.	3.1 Yarn numbering system 3.2 Indirect numbering system-Number

Unit	Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
Numbering system	3b. Differentiate between the given type of yarn numbering systems. 3c. Determine the yarn count for the given yarn. 3d. Calculate the yarn size of the given type of yarn by using yarn numbering system.	English , Metric, woolen, worsted, linen, French 3.3 Simple Calculations based on different yarn numbering system. 3.4 Resultant yarn count and related calculation. 3.5 Yarn specification-Linear density 3.6 Practical difficulties in measuring the yarn diameter. 3.7 Count, Tex, Denier
	Weaving	
Unit-IV Preparatory Elements of Weaving	4a. Describe the specified objects related to weaving. 4b. Differentiate between the given two types of process flow charts. 4c. Classify the given types of looms with respect to different parameters. 4d. Select the method to produce the given type of fabric.	4.1 Fabric: warp, weft, objects: Winding, warping, sizing, drawing-in, cone dyeing, beam dyeing, pirn winding, weaving 4.2 Process flow charts ; A) Grey fabric b) Mono color fabric (dyed warp and gray weft), c) Warp or weft stripes d) pattern, e) warp and weft both colored 4.3 Classification of looms. 4.4 Methods to produce fabric; weaving, knitting, braiding, felting, non-woven.
Unit –V Principles of Weaving	5a. Identify the requirement of cone specification for cone dyeing for the given situation. 5b. Predict the effect of creel capacity on warping in the specified machine. 5c. Identify the quality requirement of warping beam for the specified process. 5d. Identify the requirement of sizing for the given beam. 5e. Describe the given operation of the weaving section. 5f. Explain the function of the specified objects of drawing-in process. 5g. Explain with sketches the functions of the given elements of fabric. 5h. Describe the given type of Shedding with sketch. 5i. Describe with sketch the given type of fabric defects.	5.1 Types of winding, Winding package; cone, cheese, its specification, requirement of package for cone dyeing, types of cones available to wind packages for dyeing 5.2 Classimat chart, 5.3 Warping: Objects, passage of warp through the machine, types of warping, creel capacity and its effect, Quality requirement of warping beam, beam defects, requirement of package for beam dyeing. 5.4 Sizing: Importance, passage of warp, stretch, size pick up and size add-on, specification of sized beam. 5.5 Drawing-in: objects, draft, drawing in order, reed 5.6 Element of fabric; EPI, PPI, cover factor, GSM, crimp percentage, interlacement. selvage type 5.7 Shedding; objects, plain, dobby, jacquard. Picking; shuttle, projectile, rapier, air jet. Beatup: objective, Take up and Letoff. 5.8 Fabric inspection; Defects , grading

Unit	Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
		system, cut looking.

Note: To attain the COs and competency, above listed UOs need to be undertaken to achieve the 'Application Level' of Bloom's 'Cognitive Domain Taxonomy'.

9. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Pre-opening	04	02	02	04	08
II	Yarn Spinning	10	04	04	06	14
III	Yarn Numbering System	10	04	02	06	12
IV	Preparatory and Elements of Weaving	10	04	04	06	14
V	Principle of Weaving	14	04	06	12	22
	Total	48	18	18	34	70

Legends: *R=Remember, U=Understand, A=Apply and above (Bloom's Revised taxonomy)*
<u>Note</u>: *This specification table provides general guidelines to assist student for their learning and to teachers to teach and assess students with respect to attainment of of UOs. The actual distribution of marks at different taxonomy levels (of R, U and A) in the question paper may vary from above table*

10. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory learning, following are the suggested student-related *co-curricular* activities which can be undertaken to accelerate the attainment of the various outcomes in this course:

     a. Measure yarn number by direct and indirect systems.
     b. Present seminar on any relevant topic.
     c. Library survey regarding modern spinning and weaving.
     d. Prepare power point presentation for showing different types of yarn, fabric, method to produce the fabric.
     e. Undertake a market survey of different qualities of woven fabric.
     f. Massive Open Online Courses (MOOCs) may be used to teach various topics / subtopics

11. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:

     a. Massive open online courses (*MOOCs*) may be used to teach various topics/sub topics.
     b. *'L' in item No. 4* does not mean only the traditional lecture method, but different types of teaching methods and media that are to be employed to develop the outcomes.
     c. About *15-20% of the topics/sub-topics* which is relatively simpler or descriptive in nature is to be given to the students for *self-directed learning* and assess the development of the COs through classroom presentations (see implementation guideline for details).
     d. With respect to item No.10, teachers need to ensure to create opportunities and provisions for *co-curricular activities*.
     e. Guide student(s) in undertaking micro-projects.
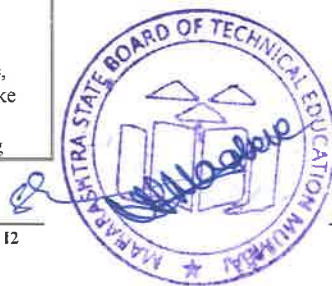
12. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student assigned to him/her in the beginning of the semester. S/he ought to submit it by the end of the semester to develop the industry oriented COs. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. The total duration of the micro-project should not be less than *16 (sixteen) student engagement hours* during the course.

In the first four semesters, the micro-project could be group-based. However, in higher semesters, it should be individually undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. A suggestive list to be given to groups of 3 to 4 students is given here. Similar micro-projects could be added by the concerned faculty:

a. **Pre opening:** Each group of 3 to 4 students will collect pictures of various stages of cultivation and preopening process and prepare booklet by labeling objective of each process.

b. **Yarn spinning:** Each batch will collect different type of yarn sample and prepare booklet by giving information related to collected sample.

c. **Yarn spinning:** Each batch will collect photographs of each machine required for yarn manufacturing and prepare flash presentation by listing objective of each process.

d. **Yarn numbering system:** Each batch will collect different sizes of yarns and prepare black card sheet by labeling there yarn numbers in tex and Ne.

e. **Principle of weaving:** Each batch will prepare flow chart diagrams for various process required for producing fabric and study objectives of various loom motions.

f. **Principle of weaving:** Each batch will prepare specification table of requirements of package dimensions and parameters required for cone , beam dyeing.

13. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication
1.	The Technology of short staple spinning	Klein, Werner	The Textile Institute ISBN : 1 87081298 8
2.	Spinning	Lord, P.R	Woodhead Publications ISBN :1 85573 9771
3.	Spinning of Manmades and Blends on cotton spinning	Salotra, K.R	The Textile Association Of India, ISBN :81 89328 00 X
4.	Spun Yarn Technology	Oxberg, Eric	Butterworths (Publishers) Limited, 1983, ISBN :0-408014644
5.	Weaving Conversion of Yarns to Fabric	Lord, P.R	Woodhead Publication ISBN :1 855734834
6.	Principle Of Weaving	Marks, & Robbinson	The Textile Institute, ISBN :0-900739797
7.	Weaving: Machines, Mechanisms, Management	Talukdar, M.K, Ajgaonkar, D.B, Sriramulu ,P.K	Mahajan Publisher Private Limited, ISBN :81-85401-16-0

S. No.	Title of Book	Author	Publication
8.	Modern Prepration and Weaving Technology	Ormerod, A.	Butterworth, (Publishers) Limited, 1983, 0408012129, 9780408012126
9.	Elements of Raw Cotton and Blow Room	Khare, A.R	Sai Book Center
10.	Cotton Spinning Calculation	Pattabhiraman, T.K	Mahajan Publisher Private Limited.

14. SOFTWARE/LEARNING WEBSITES

a. www.textileword.com
b. www.textileinfo.com
c. http://www.textileschool.com/articles/109/blow-room-functions
d. http://textilelearner.blogspot.in/2011/07/basic-operations-in-blowroom_485.html
e. http://textilelearner.blogspot.in/2011/03/blowroom-objects-of-blow-room-basic_2485.html
f. http://www.rieter.com/cz/rikipedia/articles/rotor-spinning/applications-engineering/preparation-of-raw-material/the-processing-stages/blowroom/
g. https://www.youtube.com/watch?v=IDGmXssFa6s
h. https://en.wikipedia.org/wiki/Cotton_gin
i. https://s-media-cache-ak0.pinimg.com/564x/b8/76/b6/b876b60703a1b40138e5b800dd7212e2.jpg
j. http://gluedideas.com/Encyclopedia-Britannica-Volume-6-Part-2-Colebrooke-Damascius/Cotton-Ginning-Machinery.html
k. http://textilelearner.blogspot.in/2011/08/what-is-ginning-cotton-ginning-types-of_8829.html
l. http://textilefashionstudy.com/what-is-textile-fiber-classifications-of-textile-fiber/
m. http://cms.gcg11.ac.in/attachments/article/87/CLASSIFICATION%20OF%20YARN.pdf
n. http://www.textbooksonline.tn.nic.in/books/11/stdxi-voc-textiles-em.pdf
o. https://en.wikipedia.org/wiki/Textile_manufacturing
p. http://nptel.ac.in/courses/116102005/48
q. http://nptel.ac.in/courses/116102005/49
r. http://www.clothingstudy.com/yarn-numbering-system-yarn-count-direct-system-indirect-system/
s. https://en.wikipedia.org/wiki/Units_of_textile_measurement
t. https://www.uster.com/fileadmin/customer/Knowledge/Textile_Know_How/Yarn_clearing/UCQ_Analysis_of_yarns_be_a_sophisticated.pdf