

**Program Name** : Diploma in Textile Manufacturers  
**Program Code** : TX  
**Semester** : Fifth  
**Course Title** : Automatic Weaving  
**Course Code** : 22581

### 1. RATIONALE

To Produce woven fabric and maintain quality aspects of fabric, knowledge of various components of automatic looms is very important. Understanding the principles of looms lays the foundation to understand weaving related problems in machine and other relevant mechanism. This course will facilitate students to use the principles of Dobbies, jacquards and mechanism of automatic loom to reproduce the given type of fabric and rectify the looms related problems in the industries.

### 2. COMPETENCY

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

- Use automatic weaving and different shedding mechanisms to manufacture 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:

- Use dobby mechanism to develop fancy structures.
- Apply the principles of modern dobbies to produce different design of fabric.
- Use jacquard mechanism to develop attractive designs of fabric.
- Use Box motions to produce weft patterned fabrics.
- Use automatic machine to manufacture woven fabric.

### 4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme			Credit (L+T+P)	Examination Scheme												
L	T	P		Theory						Practical						
				Paper Hrs.	ESE		PA		Total		ESE		PA		Total	
Max	Min	Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	Max	Min		
4	-	2	6	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 cognitive domain 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.

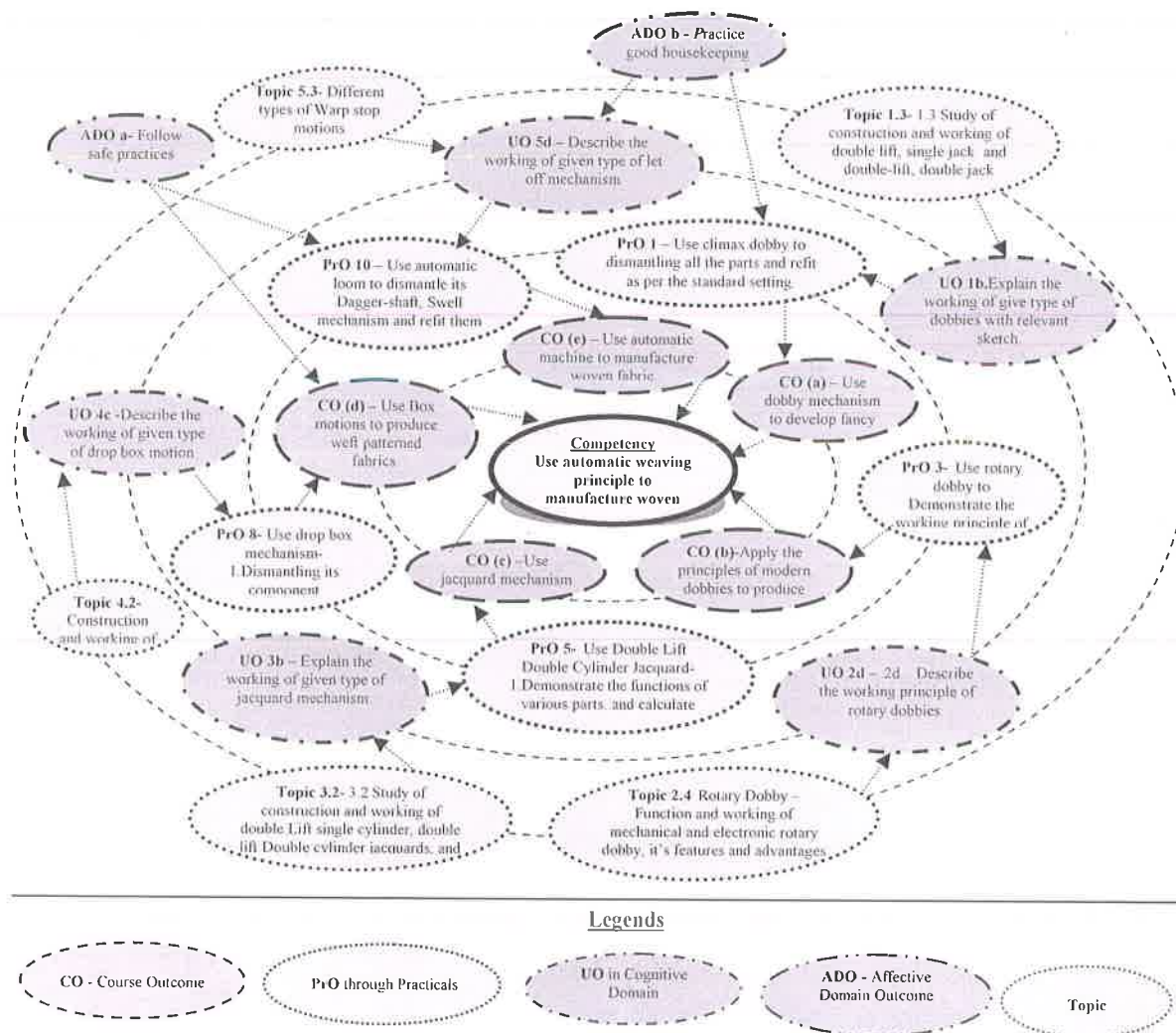


Figure 1 - Course Map

## 6. SUGGESTED PRACTICALS/ EXERCISES

The practical's 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 climax dobbie to dismantling all the parts and refit as per the standard setting.	I	02*
2	Use wooden lattice chain for reproduction of given Design on the fabric by preparing relevant peg plans for Right handed and Left handed dobbie.	I	04*
3	Use rotary dobbie to Demonstrate the working principle of various components.	II	02*
4	Use paper cam dobbie , 1. Show working principle 2. Show the function of various parts. 3. Sketch driving arrangement 4. Show the heald selection mechanism.	II	02*



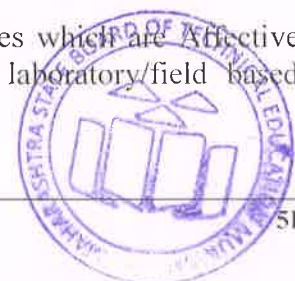
S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. Required
5	Use Double Lift Double Cylinder Jacquard- 1. Demonstrate the functions of various parts..	III	02*
6	Use Piano Card Cutting Machine to prepare cards for given design and prepare one complete design by card lacing.	III	04
7	Use Electronic jacquard to Demonstrate the working principle of various components	III	02
8	Use drop box mechanism- a) Dismantling its component b) Refitting the entire component with relevant timing and setting. c) Prepare card chain for given weft pattern.	IV	02*
9	Use automatic loom- a) To dismantle it's under pick mechanism. b) To refit all components with relevant setting and timing.	V	02*
10	Use automatic loom to dismantle its Dagger-shaft, Swell mechanism and refit them with relevant setting and timing.	V	02*
11	Use automatic loom to dismantle its Battery, Loose end cutter mechanism and refit them with relevant setting and timing.	V	02
12	Use automatic loom to dismantle its Weft fork and anti-crack, mechanism and refit them with relevant setting and timing.	V	02
13	Use automatic loom to dismantle its of Let-off motion and refit them with relevant setting and timing.	V	02*
14	Use automatic loom to dismantle its Warp stop motion and refit them with relevant setting and timing.	V	02*
<b>Total</b>			<b>32</b>

**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 judicious 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 %
a.	Preparation of experimental set up	20
b.	Setting and operation	20
c.	Safety measures	10
d.	Observations and Recording	10
e.	Interpretation of result and Conclusion	20
f.	Answer to sample questions	10
g.	Submission of report in time	10
<b>Total</b>		<b>100</b>

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. Practice energy conservation.
- d. Work as a leader/a team member..
- a. 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 1<sup>st</sup> year
- 'Organisation Level' in 2<sup>nd</sup> year
- 'Characterisation Level' in 3<sup>rd</sup> year.

### 7. 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	PrO. No.
1	Dobby mechanism with 18 heald shaft	1
2	Drop box mechanism without card saving	3
3	Cam dobbie with 24 heald shaft	4
4	Double lift Jacquard mechanism with 2 cylinders	5
5	Mechanical rotary dobbie with 12mm pitch	2 to 12
6	Ruti'c'/ Cimnico Automatic loom with 190 cm	9 to 14

### 8. UNDERPINNING THEORY COMPONENTS

The following topics are to be taught and assessed in order to develop the sample UOs given below for achieving the COs to attain the identified competency. More UOs could be added.

Unit	Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
<b>Unit- I Dobby Shedding</b>	1a. Describe the limitation of the given types of shedding mechanism. 1b. Explain the working of the given type of dobbies with relevant sketch. 1c. Mark the method of pegging for the given types dobbies. 1d. Mark the method of pegging for the given types of design. 1e. Describe with sketches the working of the given type of cross border dobbies. 1f. Distinguish between principles of the given two dobbies.	1.1 Limitation of tappet shedding. 1.2 Types of Dobbies, Study of construction and working of double lift, single jack and double-lift, double jack dobbie. 1.3 Method of pegging for right and left hand dobbie. 1.4 Heald reversing motion on looms with Dobby, Cross-border Dobby - necessity, construction and working of two cylinder mechanism, cylinder selection mechanism. 1.5 Cam Dobby – construction and working of negative cam dobbie advantages.



Unit	Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
<b>Unit-II Modern Dobbies</b>	2a. Compare the features of between the given two dobbies. 2b. Describe the working of the given type of modern dobbies. 2c. Distinguish between merits and demerits of the given two dobbies. 2d. Calculate the number of healds required to produce the given design.	3.1 Paper cam Dobby – construction and working of paper cam Dobby, 3.2 Heald selection mechanism on paper cam dobbie. 3.3 Positive dobbie – Construction and working positive dobbie, and its advantages. 3.4 Rotary Dobby – Function and working of mechanical and electronic rotary dobbie, it's features and advantages of Rotary Dobby.
<b>Unit– III Jacquard Shedding</b>	3a. Explain with sketches the working of the given type of jacquard mechanism. 3b. Distinguish between the given two types of jacquards. 3c. Explain the merits and demerits of the given types of jacquard. 3d. Describe the principle of the given type of harness tie.	3.1 Jacquard shedding – object, types of Jacquards, Single Lift Single cylinder Jacquard, double Lift single cylinder, double lift Double cylinder jacquards, and its features, 3.2 Cross-border Jacquards – object, construction and working of cross border Jacquard. 3.3 Figuring capacity of jacquard, Harness building and Harness ties, casting out. 3.4 Methods of transferring design on graph paper from motif, selection of point paper counts for it. 3.5 Electronic Jacquards – Features of electronic jacquards, its advantages over mechanical jacquard, construction and working of electronic jacquards.
<b>Unit-IV Box Motions</b>	4a. Explain the need of box motions for the given type of weft pattern. 4b. Explain with sketches the working of the given type of drop box motion. 4c. Prepare card chain for the given type of weft pattern. 4d. Explain the principle of weft mixing.	4.1 Object and types of Drop Box motions 4.2 Construction and working of Cow-burn multiple box motions 4.3 Different types of cards used for drop box motion, card saving device, preparation of card chain . 4.4 Pick and Pick, Pick at will mechanism, weft mixing with drop box.
<b>Unit –V Automatic weaving</b>	5a. Distinguish between the given two types of looms. 5b. Describe the principle of the given mechanism. 5c. Explain the need of the given type of stop motions. 5d. Describe the working of the given type of let off mechanism.	5.1 Ordinary loom and automatic loom. 5.2 pirn changing mechanism, different types of weft feelers. 5.3 Different types of Warp stop motions. 5.4 Various types of semi positive let off motions: Ruti, CIMMCO 5.5 Centre weft fork motion side weft fork motion.

*Note: To attain the COs and competency, above listed UOs need to be undertaken to achieve the 'Application Level' and above 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	Dobby Shedding	06	02	04	04	10
II	Modern Dobbies	08	02	04	08	14
III	Jacquard Shedding	18	02	06	10	18
IV	Box Motions	12	02	02	04	08
V	Automatic weaving	20	04	06	10	20
<b>Total</b>		<b>64</b>	<b>16</b>	<b>21</b>	<b>33</b>	<b>70</b>

**Legends:** R=Remember, U=Understand, A=Apply and above (Bloom's Revised taxonomy)

**Note:** 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 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: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- Visit any weaving unit equipped with multiple drop box motion mechanism to know the working of drop box motions.
- Read the safety precautions to operate the modern machines equipped with dobbies and jacquard.
- Do internet survey to study the developments in shedding mechanism.
- Guide student(s) in undertaking micro-projects.
- Library /Internet survey of Automatic Weaving.
- Prepare power point presentation or animation for understanding different mechanical let off motions.

## 11. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

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

- Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.
- '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.
- 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).
- With respect to item No.10, teachers need to ensure to create opportunities and provisions for **co-curricular activities**.
- Guide student(s) in undertaking micro-projects.
- Use proper equivalent analogy to explain different concepts.
- Use Flash/Animations to explain various principles of shedding and working of various mechanism of automatic loom.



## 12. SUGGESTED MICRO-PROJECTS

**Only one micro-project** is planned to be undertaken by a student that needs to be assigned to him/her in the beginning of the semester. In the first four semesters, the micro-project are group-based. However, in the fifth and sixth semesters, it should be preferably 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. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed three**.

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. 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. The student ought to submit micro-project by the end of the semester to develop the industry oriented COs.

A suggestive list of micro-projects are given here. Similar micro-projects could be added by the concerned faculty:

- Dobby Shedding:** Produce fabrics of different doobby design on doobby loom and prepare catalog showing their design, peg plan, draft , denting order ,method of pegging diagram and swatch of fabric.
- Modern Dobbies:** Prepare chart showing comparisons of all the doobbies.
- Jacquard shedding:** Prepare Jacquard design by using small motif on CAD software and produce sample of the same on electronic jacquard.
- Box Motions:** Collect different patterned fabric and analyze its weft pattern. Prepare card chain for analyzed weft pattern and reproduce at least one weft pattern design on box motion.
- Automatic weaving:** Collect the photographs of all elements of automatic loom and prepare booklet showing features of all the mechanism.

## 13. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication
1	Principal of weaving	Marks R. & A.T.C. Robinson	Textile Institute, 1976 ,ISBN 9780900739255
2	Automatic Weaving	Aitken J.B.	Columbine Press (Publishers) Ltd., 1965, ISBN 0900298162
3	Modern preparation and weaving machinery	Ormerod,A.	Butterworth, (Publishers) Limited, 1983 ,ISBN 0408012129
4	Weaving: machines, mechanisms, management	Talukdar M K ; P K Sriramulu; D B Ajsaonkar	Mahajan Publishers Pvt Ltd Ahmedabad,1998,ISBN 8185401160
5	Fancy Weaving Motions	Aswani K.T.	Mahajans Publishers, Ahmedabad

## 14. SOFTWARE/LEARNING WEBSITES

- <http://nptel.ac.in/courses/116102005/34>
- <http://nptel.ac.in/courses/116102005/35>
- <http://www.laxmishuttlelesslooms.com/automatic-pirn-change-weaving-loom>
- <https://textilelearner.blogspot.in/2012/02/study-on-positive-let>



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