GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Diploma

Branch: Textile Manufacturing Technology

Course / Subject Code: DI03029031

Course / Subject Name: Weaving Technology-III

w. e. f. Academic Year:	2024-25
Semester:	3rd
Category of the Course:	PCC

Prerequisite:	Fundamental understanding of automatic weaving machines, multi-box looms, Jacquard mechanisms, and the terry towel weaving process.
Rationale:	This subject is designed to provide students with a comprehensive understanding of weaving technologies used in the modern textile industry are essential for producing a wide range of complex and value-added fabrics. Students will gain fundamental knowledge of automatic weaving machines, which play a crucial role in enhancing productivity and efficiency in fabric production. The subject also covers multiple box looms, enabling the weaving of fabrics with a variety of weft colors or materials, thereby increasing design versatility. A detailed study of the Jacquard mechanism equips students with the ability to understand and operate looms capable of producing intricate woven patterns and elaborate designs, widely used in upholstery, fashion, and home textiles. Additionally, the terry weaving process, essential for towel production, is included to familiarize students with the techniques required to produce looped pile fabrics with specific performance characteristics. Overall, this subject aims to prepare students for practical challenges in industrial weaving, by equipping them with both theoretical knowledge and the technical skills required for working with advanced looms and fabric productions.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
CO-1	Make use of automatic loom for fabric production.	A
CO-2	Create fabric with numerous weft patterns using a Drop Box loom.	C
CO-3	Make use of Jacquard mechanism for producing large figure or pattern.	A
CO-4	Make use of Terry loom for producing terry fabric.	A

**Revised Bloom's Taxonomy (RBT)*

GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Diploma

Branch: Textile Manufacturing Technology

Course / Subject Code: DI03029031

Course / Subject Name: Weaving Technology-III

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA(M)	PA(I)	ESE (V)	
3	0	2	4	70	30	20	30	150

Legends: ***L****-Lecture;* ***T*** *– Tutorial/Teacher Guided Theory Practice;* ***PR*** *-Practical;* ***C*** *– Credit,* ***CA*** *-Continuous Assessment;* ***ESE*** *-End Semester Examination.*

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
Unit –1 **Automatic weaving machine**	**Automatic weaving machine** 1.1 Classification of Automatic looms. 1.2 Characteristics and advantages of Automatic loom over non-automatic looms. 1.3 Compare Automatic loom over non-automatic loom. 1.4 Working of Pirn changing mechanism. 1.5 Types of Weft feelers: Mechanical-Midget feeler, Electrical-Two-pronged feeler, Photo electrical-optical electronic 1.6 Non-stop Shuttle change mechanism 1.7 Positive Let-off motion: Bartlett, Ruti 1.8 Warp stop motion: Mechanical Northrop warp stop Motion, Electrical warp stop motion 1.9 Environmental aspects in weaving Department.	16	35%
Unit –2 **Multiple box loom**	**Multiple Box Loom** 2.1 Importance of Drop box loom 2.2 Types of box motion 2.3 Classification of Multiple box 2.4 Working of Cowburn and Peck's Drop box motion 2.5 Different devices of Drop box: Safety device in Cowburn and Peck's Drop box motion, Card saving device 2.6 Pick at will motion 2.7 Different types of pattern cards	08	18%

	2.8 Preparation of card chain for weft pattern design		
Unit –3 **Jacquard**	**Jacquard** 3.1 Need & Classification of Jacquard. 3.2 Important parts of jacquard 3.3 Sizes and figuring capacity of jacquard. 3.4 Construction & Working of Single lift single cylinder jacquard, Double lift single cylinder jacquard, Double lift Double cylinder jacquard, Electronic jacquard 3.5 Different Harness mounting: Straight tie or Norwich tie, Cross tie or London tie 3.6 Types of Tie-ups or Design tie: Straight through or Repeating tie, Centered tie, Border and middle tie, Mixed ties or Combination tie 3.7 Piano card cutting machine	13	29%
Unit –4 **Terry Loom**	**Terry loom** 4.1 Introduction of terry fabric and its uses. 4.2 Classification of Woven terry fabric 4.3 Classification of toweling fabric 4.4 Properties of terry fabric 4.5 Types of terry pile: Terry fabric with loop piles, Terry fabric with cut and opened pile 4.6 Types terry pile structures 4.7 Passage of pile and ground warp through Ruti terry loom. 4.8 Formation of the Pile by Terry mechanism and methods of creating gap between picks	08	18%
	Total	**45**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
25	**25**	**20**	**-**	**-**	**-**

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. Woven Fabric Production – II, NCUTE, NCUTE Publications, 8th Floor, Main Building, IIT, hauz khas, New Delhi-110016. 2002
2. Woven Terry Fabrics: Manufacturing & Quality management, Jitendra Pratap Singh and Swadesh Verma, Woodhead Publishing series in Textile, 2017 The Textile Institute, ISBN:978-0-08-100686-3
3. Principle of Weaving, Marks & Robinson, The Textile Institute, Manchester, England,1976, ISBN:0-900739258
4. The mechanisms of Weaving, Thomas W. Fox, Textile Book Service, New Jersey, 1992
5. Weaving machine, material & management, Ajgaonakar D.B. &Talukdar, Mahajan Publisher Private Limited. Ahmedabad.1998, ISBN:81-85401-16-0
6. Jacquard Looms - Harness Weaving, T. T. Bell, Herzberg Press LLC 107 Luigart Ct Lexington, Kentucky, 40508, ISBN: 978-1445529066
7. Performance of Home Textiles, Subrata Das, Woodhead Publication India PVT Ltd., New Delhi, 2010, ISBN: 978-0-85709-007-2
8. Hand book of Weaving, Sabit Adanur, CRC Press Taylor & Francis Group 6000 Broken Sound Parkway NW, Year-2001, ISBN: 978-1-58716-013-4
9. Principles of Woven Fabric Manufacturing, Abhijit Majumdar, CRC Press Taylor & Francis Group 6000 Broken Sound Parkway NW, Year-2017, ISBN: 978-1-4987-5911-3

(b) Open-source software and website:

1. https://nptel.ac.in/courses/116102005
2. https://textilevaluechain.in/in-depth-analysis/articles/textile-articles/noise-pollution-and-its-control-in-a-weaving-plant/
3. https://docs.google.com/presentation/d/1RVYLIbP4qrEfEd_zpFmjvPPsbLgQkt_3cWCjLWdsWpo/htmlpresent
4. https://www.youtube.com/watch?v=j23BomL9prY
5. https://www.youtube.com/watch?v=jTK5l_ENOE4
6. https://www.youtube.com/watch?v=q8hv_zP8Z78
7. https://www.youtube.com/watch?v=awGjOGo_Mis
8. https://www.youtube.com/watch?v=8o1MTfF2MU0&list=PLA1B579D4986871E8
9. https://youtube.com/watch?v=n95rq-YcLw8&list=PLA1B579D4986871E8&index=9
10. https://www.youtube.com/watch?v=q8hv_zP8Z78&list=PLA1B579D4986871E8&index=10
11. https://www.youtube.com/watch?v=nQR47jIVLX0
12. https://www.youtube.com/watch?v=HNSu0q2z8uI
13. https://www.youtube.com/watch?v=CRnSuqnuaoM
14. https://m.youtube.com/watch?v=s5uGmOrrn_I
15. https://youtube.com/watch?v=BDAdD8887QE

16. https://youtube.com/watch?v=Jivr6n3FEY0
17. https://youtube.com/watch?v=zqS7yuQIJQg

Suggested Course Practical List:

1. Demonstrate working of different types of weft feelers of Auto-looms.
2. Use pirn changing mechanism on Auto-looms.
3. Demonstrate working of non-stop type shuttle change mechanism.
4. Demonstrate working of Bartlett Let-off motions.
5. Demonstrate working of Ruti Let-off motions.
6. Use Mechanical Warp stop motion on Auto-looms.
7. Demonstrate working of Eccle's Drop box motion
8. Prepare card chain for given weft pattern
9. Demonstrate working of Single lift single cylinder jacquard
10. Demonstrate working of Double lift single cylinder jacquard
11. Demonstrate working of Double Lift Double cylinder jacquard
12. Demonstrate working principle of Electronic jacquard
13. Use different types of ties and Harness mounting
14. Demonstrate passage of material through of pile and ground warp through terry loom.

List of Laboratory/Learning Resources Required:

S. No.	Equipment Name with Broad Specifications
1	Automated loom with speed up to 120-140 RPM, negative tappet shedding using eight (8) Heald shafts, (7) seven-wheel take-up motion, positive let-off motion, mechanical serrated bar warp stop, weft stop, temple, brake, warp protector mechanism and shuttle or pirn changing mechanism with weft feeler.
2	Drop box loom with speed up to 120-140 RPM, negative tappet shedding using eight to twenty (8-20) Heald shafts, (7) seven-wheel take-up motion, positive let-off motion, mechanical serrated bar warp stop, weft stop, temple, brake and warp protector mechanism.
3	Single Lift Single Cylinder Jacquard loom of 600 hooks capacity with speed up to 120-160 RPM, picking mechanism, (7) seven-wheel take-up motion, positive let-off motion, mechanical serrated bar warp stop, weft stop, temple, brake and warp protector mechanism.
4	Terry loom with speed of 120-450 RPM with other required mechanism such as shedding using eight to twenty (8-20) Heald shafts, colour selector 4-8 colour, terry mechanism, seven-wheel take-up motion, positive let-off motion, warp stop, weft stop, temple, brake etc.

Suggested Project List:

a) **Automatic loom (Cop Changing)**: Prepare the report of different Automatic shuttle loom with their specifications.
b) **Automatic loom (Shuttle Changing)**: Prepare the report of pirn machines with their specifications.
c) **Drop box loom**: Prepare the report of different Drop box machines with their specifications.
d) **Multiple box loom:** Prepare the report of different of Multiple box loom and write features of each.
e) **Mechanical Jacquard:** Prepare the report of different of mechanical Jacquard.
f) **Electronic Jacquard:** Prepare the report of different electronically controlled jacquard.
g) **Terry loom**: Prepare the report of different terry loom manufacturer with its features.
h) **Terry Fabric:** Prepare a portfolio of samples of different types of terry fabric.
i) **Environmental aspect in weaving department:** Prepare the report of environmental aspect in weaving department.

Suggested Activities for Students:

a) Prepare report on different manufacturers' Automatic loom based on industrial visit.
b) Prepare report on Jacquard machine based on industrial visit.
c) Prepare report on Drop box loom based on industrial visit.
d) Prepare report on Terry loom based on industrial visit.

* * * * * * *