DEPARTMENT OF TECHNICAL EDUCATION (DIPLOMA SECTOR)
UTTAR PRADESH

CURRICULUM FOR DIPLOMA PROGRAMME IN TEXTILE ENGINEERING

(3rd to 4th Semester)

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Semester System

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YEAR 2025-2026

Prepared By:

INSTITUTE OF RESEARCH DEVELOPMENT & TRAINING, U.P., KANPUR

CONTENT

PREFACE

An important issue generally debated amongst the planners and educator's world over is how technical education can contribute to sustainable development of the societies struggling hard to come in the same bracket as that of the developed nations. The rapid industrialization and globalization have created an environment for free flow of information and technology through fast and efficient means. This has led to shrinking of the world, bringing people from different culture and environment together and giving rise to the concept of world turning into a global village. In India, a shift has taken place from the forgettable years of closed economy to knowledge based and open economy in the last few decades. In order to cope with the challenges of handling new technologies, materials and methods, we have to develop human resources having appropriate professional knowledge, skills and attitude. Technical education system is one of the significant components of the human resource development and has grown phenomenally during all these years. Now it is time to consolidate and infuse quality aspect through developing human resources, in the delivery system. Polytechnics play an important role in meeting the requirements of trained technical manpower for industries and field organizations.

In order to meet the requirements of future technical manpower, we will have to revamp our existing technical education system and one of the most important requirements is to develop outcome-based curricula of diploma Programs. The curricula for diploma Programs have been revised by adopting time-tested and nationally acclaimed scientific method, laying emphasis on the identification of learning outcomes of diploma Program.

The real success of the diploma Program depends upon its effective implementation. However, best the curriculum document is designed, if it is not implemented properly, the output will not be as expected. In addition to acquisition of appropriate physical resources, the availability of motivated, competent and qualified faculty is essential for effective implementation of the curricula.

It is expected of the polytechnics to carry out job market research on a continuous basis to identify the new skill requirements, reduce or remove outdated and redundant courses, develop innovative methods of course offering and thereby infuse the much-needed dynamism in the system.

F K Khan
Director
Institute of Research Development & Training, U. P. Kanpur

1. ACKNOWLEDGEMENT

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3. All the participants from Polytechnics and other technical institutions for their professional input during curriculum workshops.

4. CDC Officer and others concerning staff of IRDT for their support and assistance in conducting curriculum workshops.

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2. SALIENT FEATURES

1. Name of the Programme	➢ Diploma in Textile Engineering
2. Duration of the Programme	➢ Three years (Six Semesters)
3. Entry Qualification	➢ Matriculation or equivalent NEP-2020/ NSQF Level 5 as Prescribed by State Board of Technical Education, UP.
4. Pattern of the Programme	➢ Semester System
5. Ratio between theory and Practice	➢ 40% (Theory) / 60% (Practical)

1) <u>Industrial Training/Internship:</u>

Four and six weeks of industrial training is made mandatory after the II and IV semesters during summer vacation. Total marks allotted to industrial training will be respectively 50 & 100.

In the last (6^{th} Semester) we have made the one semester Industrial training/Internship as optional along with usual classroom training.

2) <u>Audit & Pathways</u>:

As per AICTE and NEP-2020 directives, Essence of Indian Knowledge & Tradition, Indian Constitution, Entrepreneurship & Startup, subjects on Environmental Studies have been incorporated in the curriculum.

3) <u>Student Centered Activities</u>:

A provision of 4-8 hrs. per week has been made for organizing Student Centered Activities for overall personality development of students. Such activities will comprise co– curricular activities such as expert lectures, classroom seminars, games, hobby club like photography, painting, singing etc. declamation contests, field visits, NCC, NSS and other cultural activities, etc.

4) <u>Project work:</u>

Micro/Mini/Major project work has been included in the curriculum to enable the student to get familiarized with the practices and procedures being followed in the industries and provide an opportunity to work on some live projects in the industry.

3. EMPLOYMENT OPPORTUNITIES OF DIPLOMA HOLDERS IN TEXTILE ENGINEERING

Major clusters for textile production spread all over in India from north to south and east to west such as in Gujarat places like Ahmedabad, Bharuch etc, in Rajasthan places like Bhilwada etc.in Punjab places like Barnala, Ludhiana, in Madhya Pradesh places Budani, Chindwada etc.in west Bengal places like rishraetc There are very few colleges in India that are providing diploma engineering course in 'Textile Engineering'. Industry always required trained diploma engineers for smooth functioning and further development. The students completing this diploma course should get employment opportunities in following work profiles in different textile producing clusters on India -

1. In textile manufacturing industry primarily in private sector and textile Clusters.
2. In textile allied industries.
3. May become an entrepreneur with his/her own start up.
4. Merchandising and marketing and after sales service of textiles.
5. As quality engineers in textile industries.
6. As designer in textile industry or freelance designer.
7. As textile Engineer in textile manufacturing industries.
8. Various other opportunities in textile industry.

4. (A) PROGRAM OUTCOMES (POS)

PO1: Basics and Discipline specific Knowledge
Assimilate knowledge of basic mathematics, science, engineering fundamentals, and Textile Engineering.

PO2: Problem's Analysis and solution
Identify, analyze and solve problems using standard methods and established techniques.

PO3: Design and Development
Design solutions for technical problems.
Assist in designing components, systems, or processes to meet specific requirements.

PO4: Engineering Tools, Experimentation, and Testing

Use modern engineering tools and appropriate techniques to conduct experiments as per BIS standard.

PO5: Socio/ Economic /Environmental impact assessment/remedy.

Apply relevant technologies while considering societal needs, environmental impact keeping in view sustainable and ethical responsibilities.

PO6: Project Management and Communication
Apply engineering management principles, work effectively as an individual or in a team, and communicate clearly on activities.

PO7: Lifelong Learning
Recognize the importance of continuous learning and actively pursue self-improvement to keep pace with technological developments.

4. (B) LEARNING OUTCOMES OF THE PROGRAM

1. The learning outcome of a Diploma Programme in Textile Engineering typically includes a comprehensive understanding of various aspects of textile manufacturing, technology, and management. Here are some key learning outcomes you can expect from such a program:

2. Technical Knowledge: Graduates of the program will have a strong foundation in textile engineering principles, including knowledge of textile fibers, yarn production, fabric manufacturing processes, textile testing, and quality control.

3. Textile Design and Development: Students will learn about textile design techniques, including pattern making, fabric selection, dyeing, printing, and finishing. They will acquire skills to develop innovative textile products and understand the factors that influence design decisions.

4. Manufacturing Processes: The program will cover different textile manufacturing processes, such as weaving, knitting, nonwoven production, and garment manufacturing. Students will

gain knowledge of the machinery and equipment used in these processes and learn how to optimize production efficiency.

5. Technical Skills: Graduates will acquire hands-on skills in operating and maintaining textile machinery, conducting textile testing and analysis, and troubleshooting manufacturing issues. They will also learn about computer-aided design (CAD) software and other relevant technologies.

6. Sustainability and Environmental Considerations: The program will emphasize the importance of sustainable practices in the textile industry. Students will learn about eco-friendly manufacturing processes, waste management, recycling, and reducing the environmental impact of textile production.

7. Quality Assurance and Control: Students will understand the principles and techniques of quality control in textile manufacturing. They will learn how to conduct tests and inspections to ensure product quality and compliance with industry standards.

8. Project Management: The program may include courses on project management, where students will learn how to plan, execute, and monitor textile engineering projects effectively. This includes resource allocation, cost estimation, risk assessment, and timeline management.

9. Professional Skills: Students will develop skills in communication, teamwork, problem-solving, and critical thinking. They will learn how to collaborate with colleagues, present their ideas, and adapt to the dynamic nature of the textile industry.

10. Industry Knowledge: The program may provide insights into the textile industry, its market trends, global trade, and regulatory frameworks. Students will gain an understanding of the challenges and opportunities in the industry and develop strategies for success.

11. Ethical Considerations: Students will be introduced to ethical issues related to the textile industry, such as fair trade, labour rights, and responsible sourcing. They will learn about corporate social responsibility and the importance of ethical practices in the industry.

These learning outcomes will equip graduates of the Diploma Programme in Textile Engineering with the necessary knowledge, skills, and abilities to pursue careers in textile manufacturing, research and development, quality assurance, technical consultancy, and management positions within the textile industry.

5. ABSTRACT OF CURRICULUM AREAS

a) PROGRAM CORE COURSES

Textile Fibres (Theory)
Yarn Technology – I (Theory)
Fabric Technology – I (Theory)
Textile Fibres (Lab)
Yarn Technology - I (Lab)
Fabric Technology -I (Lab)
Advance Skill Development (Open Elective – I)
Textile Testing
Yarn Technology- II (Theory)
Fabric Technology –II (Theory)
Fabric Structure & Design
Yarn Technology II (Lab)
Advance Skill Development (Open Elective –II)
Fabric Technology II (Lab)
Principle and Design of Spinning Machine
Principle and Design of Weaving Machine
Computer Aided Design
Technical Textiles
Entrepreneurship and Start-Up

b) PROGRAM ELECTIVE COURSE

(Program Elective-1)

1. Textile Chemical Processing
2. Principal Of Design And Color

c) PROJECT WORK, SEMINAR & INTERNSHIP IN INDUSTRY

In-House Project Or
Internship Or
Industrial Training

e) AUDIT COURSES

1. Essence of Indian Knowledge and Tradition

6. STUDY AND EVALUATION SCHEME FOR DIPLOMA PROGRAMME IN TEXTILE ENGINEERING (365)

THIRD SEMESTER

SR. NO.	SUBJECTS	COURSE TYPE & CATEGORY	STUDY SCHEME Periods /Week			Credits	MARKS IN EVALUATION SCHEME								Total Marks of Internal & External
							INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
			L	T	P		Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	
3.1	TEXTILE FIBRES	PROGRAM CORE (THEORY)	03	-	-	3	40	-	40	60	3	-	-	60	100
3.2	YARN TECHNOLOGY - I	PROGRAM CORE (THEORY)	04	-	-	4	40	-	40	60	3	-	-	60	100
3.3	FABRIC TECHNOLOGY - I	PROGRAM CORE (THEORY)	03	-		3	40	-	40	60	3	-	-	60	100
3.4	TEXTILE FIBRES (LAB)	PROGRAM CORE (PRACTICAL)	-	-	04	2	-	60	60	-	-	40	3	40	100
3.5	YARN TECHNOLOGY – I (LAB)	PROGRAM CORE (PRACTICAL)	-	-	04	2	-	60	60	-	-	40	3	40	100
3.6	FABRIC TECHNOLOGY –I (LAB)	PROGRAM CORE (PRACTICAL)	-	-	04	2	-	60	60	-	-	40	3	40	100
3.7	ADVANCE SKILL DEVELOPMENT	(Q) OPEN ELECTIVE-1 ((THEORY)	02	-	-	2	50	-	-	-	-	-	-	-	N/A
		(Q)OPEN ELECTIVE-1 (Certification Course)					-	-	-	-	-	-	-	-	N/A
3.8	SUMMER INTERNSHIP** (4 WEEKS)		-	-	-	2	-	50	50	-	-	-	-	-	50
	#STUDENT CENTERED ACTIVITIES		-	-	12	-	-	50	50	-	-	-	-	-	50
Total			**12**		**24**	**20**	**120**	**280**	**400**	**180**		**120**		**300**	**700**

Q) It is compulsory to appear and to pass the examination, but marks will not be included for percentage and division of obtained marks.
Advance skill development mention at the table provides the scope of selecting the course as per choice from the elective list provided in the syllabus conducted by various agencies of repute of duration not less than 20 Hrs (Offline/Online).
Student Centered Activities will comprise of co-curricular activities like extension lectures, games, hobby clubs e.g. Photography etc., Seminars, Declamation Contests, voluntary contribution in physical activities, Educational Field Visits, NCC, NSS, Cultural Activities and Self-Study.
** Students will present a seminar on their summer internship along with certificate, project and report.

TEXTILE ENGINEERING (365)

FOURTH SEMESTER

Sr. No.	SUBJECTS	COURSE TYPE & CATEGORY	STUDY SCHEME Periods/ Week			Credits	MARKSIN EVALUATION SCHEME								Total Marks of Internal & External
							INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
			L	T	P		Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	
4.1	TEXTILE TESTING	PROGRAM CORE (PRACTICUM)	02	-	02	3	40	-	40	60	3	-	-	60	100
4.2	YARN TECHNOLOGY II	PROGRAM CORE (THEORY)	03	-	-	3	40	-	40	60	3	-	-	60	100
4.3	FABRIC TECHNOLOGY II	PROGRAM CORE (THEORY)	03	-	-	3	40	-	40	60	3	-	-	60	100
4.4	FABRIC STRUCTURE & DESIGN	PROGRAM CORE (PRACTICUM)	02	-	02	3	40	-	40	60	3	-	-	60	100
4.5	PROGRAM ELECTIVE -I	PROGRAM CORE (THEORY)	02	-	-	2	40	-	40	60	3			60	100
4.6	YARN TECHNOLOGY- II (LAB)	PROGRAM CORE (PRACTICAL)	-	-	04	2	-	60	60	-	-	40	3	40	100
4.7	FABRIC TECHNOLOGY- II (LAB)	PROGRAM CORE (PRACTICAL)	-	-	04	2	-	60	60	-	-	40	3	40	100
4.8	ADVANCE SKILL DEVELOPMENT	(Q)OPEN ELECTIVE-2 (THEORY)	02	-	-	2	50	-	-	-	-	-	-	-	N/A
		(Q)OPEN ELECTIVE- (Certification Course)						-	-	-	-	-	-	-	NA
4.9	(Q) ESSENCE OF INDIAN KNOWLEDGE AND TRADITION	AUDIT COURSE	02	-	-	-	50	-	50	-	-	-	-	-	NA
#STUDENT CENTERED ACTIVITIES			-	-	08	-	-	50	50	-	-	-	-	-	50
Total			**16**		**20**	**20**	**200**	**170**	**370**	**300**		**80**		**380**	**750**

Q) It is compulsory to appear and to pass the examination, but marks will not be included for percentage and division of obtained marks.

Advance skill development mention at the table provides the scope of selecting the course as per choice from the elective list provided in the syllabus conducted by various agencies of repute of duration not less than 20 Hrs (Offline/Online).

Student Centered Activities will comprise of co-curricular activities like extension lectures, games, hobby clubs e.g. Photography etc., Seminars, Declamation Contests, voluntary contribution in physical activities, Educational Field Visits, NCC, NSS, Cultural Activities and Self-Study.

OPEN ELECTIVE-1

SR.NO.	(Q) THEORY COURSES NAME
1.	ECONOMIC POLICIES IN INDIA (Course offered by Polytechnic Institute)
2.	PROJECT MANAGEMENT (Course offered by Polytechnic Institute)
SR.NO.	**CERTIFICATES COURSES**
1.	COURSES CONDUCTED BY CENTRE OF EXCELLENCE (ESTABLISHED BY THIRD PARTY AS: - TATA TECHNOLOGIES. etc) (ANNEXURE-1)
2.	ANY COURSE OF MINIMUM 02 CREDIT FROM NPTEL
3.	MOOCS THROUGH SWAYAM
4.	AICTE-ELIS AND CENTRALLY FUNDED TECHNICAL INSTITUTES
5.	C-DAC
6.	CERTIFICATIONS CONDUCTED BY THE INSTITUTE OF NATIONAL IMPORTANCE (IIT,NIT,IIIT ETC.)
7.	ISRO E-LEARNING
8.	OTHER RELEVANT GOVERNMENT, INTERNATIONAL/NATIONAL PLATFORMS OF REPUTE
9.	NEILIT/BITRA/NITRA/SITRA/ATIRA/SASMIRA CERTIFICATE PROGRAMME

OPEN ELECTIVE -2

SR.NO.	(Q) THEORY COURSES NAME
1.	RENEWABLE ENERGY TECHNOLOGIES (Course offered by Polytechnic Institute)
2.	ENERGY EFFICIENCY AND AUDIT (Course offered by Polytechnic Institute)
SR.NO.	**CERTIFICATES COURSES**
1	COURSES CONDUCTED BY CENTRE OF EXCELLENCE (ESTABLISHED BY THIRD PARTY AS: - TATA TECHNOLOGIES. etc) (ANNEXURE-1)
2	ANY COURSE OF MINIMUM 02 CREDIT FROM NPTEL
3	MOOCS THROUGH SWAYAM
4	AICTE-ELIS AND CENTRALLY FUNDED TECHNICAL INSTITUTES
5	C-DAC
6	CERTIFICATIONS CONDUCTED BY THE INSTITUTE OF NATIONAL IMPORTANCE (IIT,NIT,IIIT ETC.)
7	ISRO E-LEARNING
8	OTHER RELEVANT GOVERNMENT, INTERNATIONAL/NATIONAL PLATFORMS OF REPUTE
9	NEILIT/BITRA/NITRA/SITRA/ATIRA/SASMIRA CERTIFICATE PROGRAMME

ANNEXURE-1

LIST OF COURSES CONDUCTED BY TATA TECHNOLOGIES

1. Fundamentals of Innovation and Design Thinking
2. Product Design and Development
3. Product Verification and Analysis
4. Advanced Automobile
5. Electric Vehicle
6. Internet of Things
7. Advanced Manufacturing
8. Advanced Welding & Painting using Simulator
9. Industrial Automation and MES
10. Industrial Robotics
11. Inspection and Quality Control
12. Advanced Plumbing
13. AI and ML

PROGRAME ELECTIVE-1

SR.NO.	SUBJECT NAME
1.	TEXTILE CHEMICAL PROCESSING
2.	PRINCIPAL OF DESIGN AND COLOR

7. DETAILED CONTENTS OF VARIOUS SUBJETS

THEORY	3.1 TEXTILE FIBRE	L	T	P
		3	-	-

COURSE OUTCOME

Textile fibers are essential components of the textile industry, and any education in textiles would be incomplete without knowledge of textile fibers. This subject aims to provide students with a comprehensive understanding of textile fibers, including their properties, classification, and uses. Whether students become textile technologists or textile chemists, knowledge of textile fibers is crucial in their field.

LEARNING OUTCOMES

Upon completion of the course, students will be able to:

- Understand the desirable properties and classification of textile fibers.
- Comprehend the cultivation of cotton, including different varieties and the morphological structure of cotton fibers.
- Understand the properties of wool fibers, their structure, and their uses.
- Understand and explain the properties of silk fibers, their structure, and their uses.
- Explain the classification of synthetic fibres, including the role of degree of polymerization, molecular weight, and other properties required for fibre-forming polymers.
- Explain the manufacturing process of viscose fibres and their properties.
- Understand and explain different fibre spinning systems, such as melt spinning, solution spinning, dry spinning, etc.
- Explain the manufacturing process and properties of fibres like polyester, polyamide, polypropylene, and other high-performance fibres.
- Explain the manufacturing process of Acrylic and other high-performance fibres.

COURSE CONTENTS

UNIT-I Introduction of Natural and various Synthetic Fibre (06 Periods)

Definitions related to textile fibers. Classification of textile fibers, Definition of regenerated and synthetic fibres. Difference between staple and filament fibers. Essential and desirable properties of textile fibers. Advantages and disadvantages of natural fibers.Concepts of molecular weight, Degree of Polymerization, Orientation, and Crystallinity. Characteristics of fibre-forming polymers.

UNIT-II Cotton Fibre & Jute Fibre: (10 Periods)

Cotton cultivation and harvesting. Development of cotton fibers in the seed. Cotton varieties and grading, Morphological structure of cotton fibres Physical and chemical properties of cotton fibers, Applications of cotton fibers.

Jute cultivation,Retting and extraction process. Structure of jute fibers. Physical and chemical properties of jute fibers. Applications of jute fibers. Introduction to other natural bast fibers (flax, hemp) and their applications.

UNIT-III Wool Fibre & Silk Fibre (08 Periods)

Types of wool and grading. morphological structure of wool fibers. Chemical composition of wool fibers.Physical and chemical properties of wool fibers. Varieties of wool fibers and their applications.

Types of silk and its production. Chemical composition and morphological structure of silk. Physical and chemical properties of silk fibers. applications of silk fibers.

UNIT-VI Polyester Fibre & Polyamide Fibre (10 Periods)

Introduction to methods of fibre formation, Melt spinning. Manufacturing process of polyester fibres. Physical and chemical properties of polyester fibres. Applications of polyester fibres.

Manufacturing process of Nylon-6 and Nylon-66. Physical and chemical properties of Nylon-6 and Nylon-66. Applications of Polyamide fibres.

UNIT-VIII Acrylic Fibre & Regenerated Fibres (08 Periods)

Manufacturing process of acrylic fibre. Dry spinning, Physical and chemical properties of acrylic fibres. Applications of acrylic fibres.

Introduction to regenerated fibres, Wet Spinning, Raw materials for viscose rayon, Manufacturing sequence of viscose fibres.

INSTRUCTIONAL STRATEGY

The instructional strategy for this carpet manufacturing curriculum combines interactive lectures, visual aids, hands-on activities, and discussions to enhance understanding and engagement. Each unit uses specific methods—such as concept mapping for terminology, group classification tasks for design origins, guest lectures or videos for the Indian carpet sector, and fiber identification activities—to align with the learning outcomes. Real-world examples, cultural context, and physical samples are integrated throughout to make learning relevant and practical, while formative assessments like quizzes, worksheets, and reflections help monitor student progress effectively.

MEANS OF ASSESSMENT

Assessment will be carried out through a combination of formative and summative methods. Formative assessments will include quizzes, class discussions, group activities, worksheets, and short reflective writing to evaluate on going understanding. Summative assessments will consist of written tests, classification charts, group presentations, and practical evaluations (e.g., fiber identification). These varied assessment tools will help measure students' knowledge, analytical skills, and application of concepts in real-world contexts.

RECOMMENDED BOOKS -

1. वस्त्रेरेशे–उत्पादनविशेषताएँएवंउपयोग–DR. D.B. Shakyawar&Dr. M.K. Singh, abhishek Publication Chandigarh/ New Delhi.
2. Textile Fibre by Ghol and Valanslk`
3. S. P. Mishra, A textbook of Fibres Science and technology, New Age International (p) Ltd 2000.
4. H V S Murthy, Textile Fibres- Textile Association Publication 1995.
5. Textile Fibres –I By Dr. V.A. Shenai

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	06	14
2	10	24
3	08	20
4	10	24
5	08	18
Total	**42**	**100**

THEORY	3.2 YARN TECHNOLOGY-I	L	T	P
		4	-	-

COURSE OBJECTIVES:

Yarn manufacturing is the vital process of the textile industry. Yarn Technology-I deals with the yarn manufacturing activities involved in industry.

LEARNING OUTCOMES:

After studying this course, the students will be able to:

- Understand cotton ginning process.
- Understand about blow room process
- Understand the cotton carding
- Understand the cotton drawing and combing process.
- Understand the roving process

COURSE CONTENTS

Unit – 1: Ginning, Mixing and Blow Room (12 Periods)

Ginning & Mixing: Object and Classification of Ginning and Baling. Mixing and its importance, method of mixing. Advantages and disadvantages. Description and working of auto mixer and other modern blenders.

Blow Room: Objects of Blow room. Importance of opening and cleaning.
Study of opening and cleaning machines e.g. Blending bale opener, hopper feeders, Step cleaner, Shirley opener, Whitin axiflow machine, Air stream cleaner, Three bladed beater and Kirschner beater. Nature of waste extracted in various openers and beaters E. R. M. cleaner and Mono cylinder beaters. Construction & Working of Bale Plucker. Lap forming mechanism, Object and mechanism of Calendar Roller and their weightings.

Unit – 2: Carding (10 Periods)

Objects of carding, passage of material through the card, cards parts and their functions e.g. Feeding system Licker-in, mote knives, Back plate front plate, Cylinder, Flats, Doffer, Under casing etc. Theory of carding actions in a revolving flat card. Flexible and metallic card clothing. Types of clothing wires and its geometry.
Calculation of speeds, drafts and productions of card and drawing machines. Calculations of production, efficiency, draft and waste percentage.

Unit – 3: Drawing **(10 Periods)**

Objects of drawing, Construction of draw frame, its parts and their functions and passage of material through drawing frame. Drawing rollers, Top and Bottom drafting rollers and their construction. Principles of doubling and drafting. Importance of stop motions, study of electrical stop motions. Study of different drafting systems e.g. 2/2, 2/3, 3/5, 4/4 and 4/5 drafting systems. Importance and study of Autolevellors Special features of high-speed draw frame, their names and different models. Defects and remedies in drafting operating. Calculations based on draft & production in draw frame.

Unit – 4: Combing **(10 Periods)**

Brief idea of combing and combing operation.
Detail description of Halmann & Nasmbith comber.
Calculation of Noil% and production of comber.

Unit – 5: Roving **(14 Periods)**

Objects of roving study and construction and functions of various parts of speed frame/ simplex and passage of material through them. Drafting mechanism, drive of drafting rollers, pressure on drafting rollers Basic principles of Cone drum. Twisting mechanic, study of motions required for twisting flyer and its functions. Winding: Principle of winding, bobbin leading and flyer leading winding, drive of winding mechanism. Traverse motion given to bobbins, building motion and its functions. Differential motion, its objects and working principles.

INSTRUCTIONAL STRATEGY

Student should be encouraged to participate in role play and other student-centered activities in classroom and actively participate in listening exercises

MEANSOFASSESSMENT

- Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making
- Actual laboratory and practical work, model/prototype making and viva- voce

RECOMMENDED BOOKS:

1. Technology of Sort Staple Spinning by W.Klein
2. Principle of Spinning by A.R. Khare

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (periods)	Marks Allotted (%)
I	12	24
II	10	19
III	10	19
IV	10	19
V	14	19
Total	**56**	**100**

THEORY	3.3 FABRIC TECHNOLOGY-I	L	T	P
		3	-	-

COURSE OBJECTIVES:

Fabric manufacturing is the vital process of the textile industry. Fabric Technology-I deals with the fabric manufacturing activities involved in industry.

LEARNING OUTCOMES:

After studying this course, the students will be able to:

- Understand winding process of yarn.
- Understand warping process of yarn
- Understand sizing process of yarn.
- Understand the classification of weaving and different motions involve in it.

COURSE CONTENTS

Unit – 1: Winding (08 Periods)

1. Objective of winding. Types of packages,
2. Details working principle, passage of materials of drum and precision winding.
3. Traversing mechanisms (Rotary, Reciprocating)
4. High speed and super high-speed warp winding machines- Scholahorst auto coner, Murata winding machine.
5. Study of various types of slub catchers, tensioning devices,
6. Features of automatic pirn winding machines.
7. Bunch building mechanisms.

Unit – 2: Warping (08 Periods)

1. Introduction to various ways of warping.
2. Types of creels and their description.
3. Study the Direct Warping and Sectional warping machine.
4. Stop motions and tensioning devices.
5. Commonly occurring faults in warping and their causes and remedies.

Unit – 3: Sizing (08 Periods)

1. Object of warp sizing.
2. Introduction to various methods of sizing.
3. Detail Study of slasher sizing machine and multi cylinder sizing machine
4. Various kinds of sizing ingredients used for cotton, polyester, viscose and their blends.
5. Manual methods of drawing-in and denting of warp.

Unit – 4: Different Types of Motion in Weaving (14 Periods)

Primary motion, Secondary motion.

Primary Motion:

A. Shedding:

1. Objective of Shedding Mechanism
1. Different types of healds ,
2. Tappet shedding mechanism

3 Introduction to various types of tappets.
4. Designing of negative shedding tappets.
5. Heald reversing Mechanism.

B. Picking and Beat-Up

i) Objective of Picking Motion, classification

(ii) Mechanism of over pick and under pick motions their merits and demerits - Methods of varying the intensity of picking in each case. Velocity of shuttle.

(v) Beating up motion: Mechanism of beating motion. Eccentricity of sley.

Secondary motion

1. TAKE-UP MOTIONS AND LET OFF MOTIONS

(i) Various types of take up motions.

(ii) Study of five and seven wheel intermittent positive take up motion and calculations.

(iv) Negative take up motion.

(v) Let off motions: Various types of let off motions. Study of negative let off motions. Study of semi-positive & positive let off motion

Unit – 5: Calculation (04 Periods)

(i) Calculation pertaining to resultant count, average count, moisture content, tape length. Crimp%

(ii) Calculation of wt- of warp, weight of weft, wt/sq. yard etc.

INSTRUCTIONAL STRATEGY

Student should be encouraged to participate in role play and other student-centered activities in classroom and actively participate in listening exercises

MEANS OF ASSESSMENT

- Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making
- Actual laboratory and practical work, model/prototype making and viva- voce

RECOMMENDED BOOKS:

1. Industrial Practices in weaving preparatory by Dr. Mukesh kr. Singh
2. Weaving Preparation technology by Dr. N. Gokarneshan
3. Principal of woven fabric manufacturing by Abjit Majumdar CRC press

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (periods)	Marks Allotted (%)
I	08	20
II	08	20
III	08	20
IV	14	30
V	04	10
Total	**42**	**100**

PRACTICAL	3.4 TEXTILE FIBRE	L	T	P
		-	-	4

LIST OF PRACTICALS

1. Checking moisture regain of different natural textile fibres using a reputable brand conditioning oven.
2. Checking moisture regain of different synthetic textile fibres using a reputable brand conditioning oven.
3. Identifying of cotton fibers under a microscope and drawing their longitudinal and cross- sectional views.
4. Identifying of cotton fibers by chemical, physical test.
5. Identifying of jute fibers under a microscope and drawing their longitudinal and cross- sectional views.
6. Identifying of jute fibers by chemical, physical test.
7. Identifying of wool fibers under a microscope and drawing their longitudinal and cross- sectional views.
8. Identifying of wool fibers by chemical, physical test.
9. Identifying of silk fibers under a microscope and drawing their longitudinal and cross- sectional views.
10. Identifying of silk fibers by chemical, physical test.
11. Identifying of polyester fibers under a microscope and drawing their longitudinal and cross-sectional views.
12. Identifying of polyester fibers by chemical, Physical test.
13. Identifying of polyamide fibres under a microscope and drawing their longitudinal and cross-sectional views.
14. Identifying of polyamide fibres by chemical, physical test.
15. Identifying of acrylic fibers under a microscope and drawing their longitudinal and cross- sectional views.
16. Identifying of acrylic fibers by chemical, Physical test.
17. Identifying of viscose fibers under a microscope and drawing their longitudinal and cross- sectional views.
18. Identifying of viscose fibers by chemical, physical test.
19. To do quantitative estimation of fibres in a blend

PRACTICAL	3.5 YARN TECHNOLOGY -I	L	T	P
		-	-	4

LIST OF PRACTICALS (To perform any Ten practical)

1. Operation, Setting and Gauging of blending bale opener (hopper feeder) and to measure the dimension of various important parts of the machine.
2. To calculate the speed of different moving parts of blending bale opener (hopper feeder).
3. Operate and gauge the step cleaner and other opening machines available in the lab and also calculate speeds of different moving parts.
4. Adjustments of the wight per yard of the lap and its length.
5. Operate the card machine and produce sliver and to practice piecing lap and sliver.
6. To set and gauge different part of card machine.
7. Calculate the speeds of cylinder, flats, doffer and licker-in and other moving parts of card machine.
8. To calculate all tension drafts, all intermediate drafts, total drafts and draft constants of a card machine.
9. To calculate number of laps consumed per shift of eight hours.
10. To operate and set timing of comber and prepare sliver.
11. Set and gauge various parts of comber.
12. To calculate and analyse the comber waste percentage practically and evaluate the combing efficiency.
13. To calculate the speed of different moving parts of a draw frame machine
14. To calculate the production on draw frame per delivery per machine per shift of eight hours

PRACTICAL	3.6 FABRIC TECHNOLOGY- I	L	T	P
		-	-	4

LIST OF PRACTICALS (To perform any Ten practical)

1. Practice in preparing cones, cheeses and pirns from hanks or ring bobbins.
2. Practice in creeling and preparation of warp on sectional/mill warping machine of required number of ends and width.
3. Practice in creeling and preparation n of warpers beam on High-Speed warping machine of required warp plan.
4. Practice in operating sizing machine (if working model of sizing plant available).
5. Practice of size paste preparation in laboratory.
6. Practice of making weaver's knot in laboratory.
7. Practice in drafting and denting for different design draft.
8. Study and sketch the important parts of pirn winding machine.
9. Study and sketch the important parts of warp winding machine.
10. Study and sketch the important parts of sectional warping machine.
11. Prepare Negative cam of different weaves.
12. Study and sketch the passage of Warp sheet through different loom parts.
13. Draw the gearing diagram of 5 wheel take up motion and make calculations
14. Draw the gearing diagram of 7 wheel take up motion and make calculations
15. Study and sketch the working of Let-off Mechanism.

THEORY	3.7 ECONOMIC POLICIES IN INDIA (OE-1)	L	T	P
		2	-	-

COURSE OBJECTIVE:
The objective of this course is to familiarize the students of different streams with the basic concepts, structure, problems and issues concerning Indian economy.

LEARNING OUTCOMES:
At the end of the course, the student will be able to:
- Understand Indian economics policy, planning strategies
- It will enable students to comprehend theoretical and empirical development across countries and region for policy purposes
- Development Economics as a discipline encompasses different approaches to the problems of unemployment, poverty, income generation, industrialization from different perspectives
- Able to identify the problems and capable of deciding the application for future development
- Analyze economic issues and find solutions to complex economic problems and take correct economic judgment

COURSE CONTENTS

Unit-1: (6 Periods)
Basic features and problems of Indian Economy: Economic History of India; Nature of Indian Economy, demographic features and Human Development Index, Problems of Poverty, Unemployment, Inflation, income inequality, Black money in India.

Unit-2: (5 Periods)
Sectoral composition of Indian Economy: Issues in Agriculture sector in India, land reforms Green Revolution and agriculture policies of India,

Unit-3: (5 Periods)
Industrial development, small scale and cottage industries, industrial Policy, Public sector in India, service sector in India.

Unit-4: (7 Periods)
Economic Policies: Economic Planning in India, Planning commission v/s NITI Aayog, Five Year Plans, monetary policy in India, Fiscal Policy in India, Centre state Finance Relations, Finance commission in India. LPG policy in India

Unit-5: (5 Periods)
External sector in India: - India's foreign trade value composition and direction, India Balance of payment since 1991, FDI in India, Impact of Globalization on Indian Economy, WTO and India.

INSTRUCTIONAL STRATEGY
- Teachers should focus on conceptual clarity.
- An industrial visit can be organized in relevant industries. Audio-visuals aids should be used to teach.

MEANS OF ASSESSMENT
- Assignments and quiz/class tests
- Seminar, Presentation, Viva-voce.

RECOMMENDED BOOKS:

1. Dutt Rudder and K.P.M Sunderam (2017). Indian Economy. S Chand & Co. Ltd. New Delhi.
2. Mishra S.K & V.K Puri (2017). Indian Economy and –Its Development Experience. Himalaya Publishing House.
3. Singh, Ramesh, (2016): Indian Economy, Tata-McGraw Hill Publications, New Delhi.
4. Dhingra, I.C., (2017): March of the Indian Economy, Heed Publications Pvt. Ltd.
5. Karam Singh Gill, (1978): Evolution of the Indian Economy, NCERT, New Delhi
6. Kaushik Basu (2007): The Oxford Companion to Economics of India, Oxford University Press.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (periods)	Marks Allotted (%)
1	06	20
2	05	20
3	05	17
4	07	23
5	05	20
Total	**28**	**100**

THEORY	3.7 PROJECT MANAGEMENT (OE-1)	L	T	P
		2	-	-

COURSE OBJECTIVE:
A project plan starts by defining and confirming goals, then identifying tasks to achieve them. It also involves applying key project management skills like planning, organization, and time management to ensure successful execution.

LEARNING OUTCOMES:
At the end of the course, the student will be able to:

- Understand the importance of projects and its phases.
- Analyze projects from marketing, operational and financial perspectives.
- Evaluate projects based on discount and non-discount methods.
- Develop network diagrams for planning and execution of a given project.
- Apply crashing procedures for time and cost optimization.

COURSE CONTENTS

Unit-1: (5 Periods)
Concept of a project: Classification of projects- importance of project management- The project life cycle- establishing project priorities (scope-cost-time)project priority matrix- work break down structure.

Unit-2: (6 Periods)
Capital budgeting process: Planning- Analysis-Selection-Financing-Implementation-Review. Generation and screening of project ideas- market and demand analysis- Demand forecasting techniques. Market planning and marketing research process- Technical analysis

Unit-3: (5 Periods)
Financial estimates and projections: Cost of projects-means of financing-estimates of sales and production-cost of production-working capital requirement and its financing-profitability projected cash flow statement and balance sheet. Break even analysis.

Unit-4: (6 Periods)
Basic techniques in capital budgeting: Non discounting and discounting methods- payback period-Accounting rate of return-net present value-Benefit cost ratio-internal rate of return.
Project risk. Social cost benefit analysis and economic rate of return. Non-financial justification of projects**.**

Unit-5: (6 Periods)
Project administration: progress payments, expenditure planning, project scheduling and network planning, use of Critical Path Method (CPM), schedule of payments and physical progress, time-cost trade off.
Concepts and uses of PERT cost as a function of time, Project Evaluation and Review Techniques/cost mechanisms. Determination of least cost duration. Post project evaluation. Introduction to various Project management softwares.

INSTRUCTIONAL STRATEGY

- Teachers should focus on conceptual clarity.
- An industrial visit can be organized in relevant industries. Audio-visuals aids should be used to teach.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests
- Seminar, Presentation, Viva-voce.

RECOMMENDED BOOKS:

1. Project planning, analysis, selection, implementation and review – Prasannachandra – Tata McGraw Hill
2. Project Management – the Managerial Process – Clifford F. Gray & Erik W. Larson – McGraw Hill
3. Project management - David I Cleland - Mcgraw Hill International Edition, 1999
4. Project Management – Gopala Krishnan – Mcmillan India Ltd.
5. Project Management- Harry-Maylor-Peason Publication

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (periods)	Marks Allotted (%)
1	05	14
2	06	14
3	05	24
4	06	24
5	06	24
Total	**28**	**100**

PRACTICUM	4.1 TEXTILE TESTING	L	T	P
		2	-	2

COURSE OUTCOME

As the name implies this paper aims to develop in the incumbent the capability of testing the products and its components for desired results. Without it a product can never be claimed for any standard.

LEARNING OUTCOMES

After studying this course, the students will be able to:

- Understand the importance of textile testing
- Understand use of statistics in testing
- Understand fiber testing for various parameters
- Understand yarn testing for various parameters
- Learn the basic Textile chemical testing.

DETAILED CONTENTS

UNIT-1 Importance of Textile Testing: (05 Periods)

Introduction to textile testing, properties of fibres, yarns and fabrics and their relevance in assessing the performance, of textiles during and after manufacture. Brief introduction of ISO.,
Definition of sample, sample size, sampling Technique, Introduction to quality control, Accuracy of measurement, presentation and analysis of data, SQC charts analysis of defects, difference between average and correlation. Standard deviation and coefficient of variation.

PRACTICAL

1. To Calculate the count/Denier/Tex of the different types of yarn

UNIT-2 Fibre Testing: (06 Periods)

Fibre Length (mean length, effective length and staple length. Fiber Length Measurement - Use of Baer sorter, Fibrograph, Uster-stapler, their principles of operation, Fibre Fineness Measurement - By cutting and weighing method, Shefield micronaire, Aerlometer, Maturity of cotton by caustic soda method and by airflow methods, Role of Humidity-Absolute Humidity, Relative Humidity, moisture Regain, Moisture content.
Introduction to H.V.I. (High Volume Instruments)
Fiber strength testing by stelometer

PRACTICAL

1. Find the staple length of fiber by Bare Sorter.
2. Find out fibre length by analytical digital fibrograph.
3. Measure fibre fineness by flowing air through a sample of fibre by micronaire.
4. Fiber Strength Testing by Stelometer

UNIT-3 Yarn Testing: **(07 Periods)**

Concept of count, its measurement by different methods. Concepts of S & Z twist, relation between tpi, twist multiplier and count., Measurement of yarn twist by Rock bank twist tester, continuous twist tester and by twist and untwist methods Measurement of yarn diameter by microscope.

Yarn strength testing, types of testing machines, single yarn strength testing and Lea strength testing.

Nature of irregularities – short term, medium term and long-term variations, periodic and non-periodic irregularities. Analysis of classmate and classifaults

PRACTICAL

1. To find the count of yarn by any one
   (i) by physical balance
   (ii) by yarn quadrants balance.
   (iii) by Beasley yarn balance.
2. Determine the twist of yarn per inch/per meter in double yarn and its individual components by continuous twist tester and twist and untwist tester.
3. Find out lea strength of cotton yarn by lea strength tester (Power driven) and CSP.
4. Test evenness of the yarn by evenness tester.

UNIT-4 Fabric Testing: **(06 Periods)**

1. Fabric strength testing by cut strip, grab strip and revealed strip methods.
2. Fabric tear testing by tongue tear, trapezoid tear test.
3. Bursting strength testing by hydraulic strength tester.

PRACTICAL

1. Examine the bursting strength of a fabric by bursting strength tester.
2. Find out the relative abrasion properties of fabrics by Martindale abrasion tester.
3. Find the breaking strength of different textile fabrics by means of cloth strength tester (power driven).
4. Measure crimp by Shirley crimp meter.
5. Find out air permeability of fabric by air permeability tester.
6. Measure crease recovery of fabric by crease recovery tester.
7. Test of pilling of fabrics by computerized pilling tester.

UNIT-5 Textile Chemical Testing: (04 Periods)

1. Estimation of blend composition (Nylon, Polyester, Acrylic, Polyethylene, Cotton, wool, silk).

2. Colour fastness

   i. Colour fastness to light
   ii. Colour fastness to washing
   iii. Colour fastness to rubbing
   iv. Colour fastness to perspiration
   v. Colour fastness to chlorine
   vi. Water absorbency test

PRACTICAL

1. Estimation of final pH value of finished fabric.
2. Light fastness test
3. Washing fastness test
4. Rubbing fastness test
5. Perspiration fastness test
6. Absorbency test

INSTRUCTIONAL STRATEGY

Teacher should take theory lecture, demonstration of concepts and prototype

MEANS OF ASSESSMENT

- Assignments and quiz/class tests
- Mid-term and end-term written tests

RECOMMENDED BOOKS

1. Textile Testing- J.E.Booth
2. Physical testing of textile by B P Saville

WEBSITES FOR REFERENCE:

https://nptel.ac.in/

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Periods)	Marks allotted (%)
1	05	18
2	06	22
3	07	30
4	06	20
5	04	10
Total	**28**	**100**

THEORY	4.2 YARN TECHNOLOGY- II	L	T	P
		3	-	-

COURSE OBJECTIVES:

Yarn manufacturing is the vital process of the textile industry. Yarn Technology-II deals with the yarn manufacturing activities involved in industry.

LEARNING OUTCOMES:

After studying this course, the students will be able to:

- To understand advance spinning.
- To understand the various aspect of Yarn Doubling.
- To Calculate production, Twist, TM in ring frame and doubling machine

COURSE CONTENTS

Unit – I: Ring Frame (08 Periods)

Objects of ring frame, construction and functions of various parts of ring frames Viz Rings, Spindles, Balloon Control Rings, Spacer, Aprons, Cots, Spindle tape, Rising and Falling Lappets. Traveller, Function of Traveller, Traveller type, size and No.

Passage of material through ring frames. Twisting of Yarn, Effect of Twist, Twist terminology, Concept of twist multiplier, Factors affecting twist in spinning. Principles of Roller drafting and Drafting systems, Pneumatic drafting and their advantages, break draft and its effect. Building motion, its objects construction and working. Causes of end breaks in ring frame. Limitation of Ring Spinning. Yarn faults and their remedies. Recent developments in Ring Spinning.

Unit – II: Ring Frame Calculation (08 Periods)

Calculation of Draft twist, Production and efficiency for different counts of Yarns. Calculation of balancing machines used in spinning processes for various counts- Spin Plan. Concept of average mill count and 40's conversion. Traveller speed, traveller lag calculation.

Unit– III: Doubling (08 Periods)

Two for One Twister - Basic principles, Machine geometry, Different types of T.F.O. twister. Production and efficiency calculation and Advantages over ring doubling. Fancy doubling Yarns, their objects and their production Viz. Ply Yarn, Tape Yarn, Core Yarn and Sewing Threads. Calculation of folded yarns.

Unit– IV: Process Control in Spinning (08 Periods)

Control of mixing quality and cost, waste and cleaning in blow room and carding, comber waste yarn realisation. Measurements and analysis of productivity, of different M/c. Control of yarn count, strength, evenness and imperfections, statistical interpretation of data. Breakage and efficiency studies and their analysis.

Unit– V: Advance Spinning **(10 Periods)**

Open end spinning: Different styles of open end spinning such as Rotor spinning, Air jet spinning, Friction spinning, Air vortex spinning, Electrostatic spinning, Properties of open-end spinning yarns defects of Open-end spinning yarns.

INSTRUCTIONAL STRATEGY

Teacher should take theory lecture, demonstration of concepts and prototype

MEANS OF ASSESSMENT

- Assignments and quiz/class tests, mid-term and end-term written tests
- Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva voce.

RECOMMENDED BOOKS:

1. Technology of Sort Staple Spinning by W.Klein
2. Principle of Spinning by A.R. Khare
3. Spun Yarn Technology by Carl A. Lawrence
4. Cotton Spinning Calculation and Yarn Cost by James Winterbottom

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (periods)	Marks Allotted (%)
I	08	24
II	08	19
III	08	19
IV	08	19
V	10	19
Total	**42**	**100**

THEORY	4.3 FABRIC TECHNOLOGY II	L	T	P
		3	-	-

COURSE OBJECTIVES:

Weaving is a vital activity in textile industry. The two papers Weaving Technology-I and Weaving Technology-II deal with the activities involved in the weaving process.

LEARNING OUTCOMES:

After studying this course, the students will be able to:

- Understand the Various advanced shedding technique i.e., Dobby, Jacquard.
- Able to Prepare Dobby Lattice and Jacquard Card.
- Understand various techniques of more than two coloured weft insertion.
- Understand the Automation in Shuttle Weaving.

COURSE CONTENTS

Unit – I: Dobbies **(08 Periods)**

(i) Classification of dobbies.
(ii) Study of single lift dobby -Keighley and Climaxdobbies.
(iii) Positive dobbies (any two dobbies)
(iv) Method of preparing dobby lattice and Pattern cards
(v) Cross border dobby.
(vi) R. H. and L. H. dobby,

Unit – II: Multiple Box Motion **(08 Periods)**

(i) Introduction to multiple box motions.
(ii) Kinds of multiple box motions.
(iii) Study of Cow burn and Peck's box motion its card saving device, safety devices.
(iv) Study of Knowle's box motion.
(v) Study of pick at will box arrangement.
(vi) Preparation of chain for given pattern of weft

Unit– III: Jacquard **(08 Periods)**

(i) Introduction to figure weaving.
(ii) Kinds of jacquard.
(iii) Single lift single cylinder jacquard
(iv) Double lift single cylinder jacquard.
(v) Double lift double cylinder jacquard.
(vi) Cross border jacquard.
(vii) Harness ties.
(viii) Card cutting, Piano card cutting machine and lacing of cards

Unit– IV: Automatic Weaving **(08 Periods)**

(i) Pirn changing mechanism.
(ii) Shuttle changing mechanism.
(iii) Study of side weft fork motions.
(iv) Study of center weft fork motions.
(v) Study of loose reed motion.(Warp Protector)
(vi) Study of fast reed motion. (Warp Protector)
(vii) Mechanical and Electrical type warp stop motion

Unit– V: Advance Weaving **(10 Periods)**

(i) Principle of operation for shuttle less looms comparative study of new systems of weft insertions, Weft storage unit.
(ii) Types of Selvedge and their formation.
(iii) Working and detailed description of Projectile, Rapier, Air jet and Water Jet Weaving machine,
(iv) Principle of multi-phase weaving.

INSTRUCTIONAL STRATEGY

Teacher should take theory lecture, demonstration of concepts and prototype

MEANS OF ASSESSMENT

- Assignments and quiz/class tests, mid-term and end-term written tests
- Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva voce.

RECOMMENDED BOOKS:

1. Weaving: Machine, mechanism and Management by M.K. Talukdar
2. Principle Of Weaving by Mark& Rabinson
3. Weaving Technolgy-II by NCUTE

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (periods)	Marks Allotted (%)
I	08	20
II	08	20
III	08	20
IV	08	20
V	10	20
Total	**42**	**100**

PRACTICUM	4.4 FABRIC STRUCTURE & DESIGN	L	T	P
		2	-	2

COURSE OUTCOME

The importance of the paper lies in the fact that it introduces the reader with different varieties of the fabric and designs and related technical terminology. Knowledge of these things very base of textile designer's working.

LEARNING OUTCOMES
After studying this course, the students will be able to:

- Understand about classification of woven fabrics
- Understand various technical items used in cloth construction.
- Able to analysis the woven fabric structure, Construct the elementary weaves.
- Understand about special types of weaves.
- Construct the advanced design on graph paper.
- Understand the manufacturing technique of the advanced design in weaving machine
- Identify the Application Area of the advanced design, Differentiate between basic weave and advanced weave.

DETAILED CONTENTS

UNIT-1 Introduction and Plain Weave: (05 Periods)

Introduction to fabric structure. Explanation of woven structure and other fabric structures. e.g. Knitted, Non-woven, Bonded etc.

i. Definition of Warp and Weft, Ends and Picks. Determination of warp and wept in a given fabric. Design, Repeat of a design, Draft, Lifting or Peg plan and Denting order, Types of drafts used in the manufacture of the fabrics.

ii. Construction of plain weaves on point or graph paper. Relation of draft, design and peg plan.
iii. Construction of plain weave and its derivates in the form of simple Matt or Hopsack and Ribbed Structures.

PRACTICAL

1. Manufacturing of Plain weave and their derivatives on Desk Loom**.**

UNIT-2 Twill Weaves: (05 Periods)

Continuous regular twills, pointed twills, Combined twills, Rearranged twills, Broken twills, Fancy twills, Herring bone twills.

PRACTICAL

1. Analysis of a fabric and its objects. Confirmation of warp and weft and determination of weaving particulars from the given sample of a fabric.
2. Manufacturing of Twill weave and their derivatives on Desk Loom**.**

Unit-3 Satin and Sateen Weave, Miscellaneous Weave : (05 Periods)

Characteristics and uses of satin and sateen weaves. Construction of regular and irregular satin and sateen, Diamond and Diaper weaves on pointed draft, Simple Honeycomb, Brighton Honeycomb, Huck-a back, weaves, Mock-leno weaves, Sponge weaves, Devon huck, Barley Corn, Stitched hop-sack, Twilled hop-sack, Stripe and Check Weave

PRACTICAL

1. Manufacturing of SATIN AND SATEEN WEAVE on Desk Loom.

Unit-4 Welts and Piques, **Bed Ford Cords: (04 Periods)**

Varieties and characteristics of piques and welts, methods of embellishing pique fabrics, their structure, plain pique, backed pique, fast backed welts and waved pique.

Plain faced bed ford, wadded bed ford cord, bed ford cord arranged with alternate picks and cords containing odd number of ends. twill-faced bed ford cord.

Unit 5 Backed Fabrics (Warp and Weft), Extra Warp and Weft: (05 Periods)

Backed fabrics, wadded warp and weft backed fabrics, their beaming and drafting procedure. Principles of figuring with extra warp and weft one and one i.e. pick and pick wefting, two and two wefting. Methods of disposing of extra threads on the back of the fabric. Spot figures with extra warp and extra weft arranged in a particular order.

Unit-6 Double Cloth: (04 Periods)

Construction of double and multiple cloths on design paper, their beaming, drafting and pegging. Double Cloth according to types of stitching. Types of double structures viz.
Tubular Fabrics. Double-faced Fabrics., With wadded thread in both warp and weft direction.

Fabrics opening to double the width. Centre stitched double cloth., Centre Warp Stitched, Centre Weft Stitched

INSTRUCTIONAL STRATEGY

Teacher should take theory lecture, demonstration of concepts and prototype

MEANS OF ASSESSMENT

- Assignments and quiz/class tests, mid-semester and end-semester written tests
- Actual practical work, exercises and viva-voce
- Presentation and viva-voce

RECOMMENDED BOOKS

1. Fabric Structure and Design by N. Gokarveshan
2. Watson's textile design &colour by Z. J. Grosicki.
3. Woven fabric structure design and product planning by Dr. J. Hayavadana
4. Mastering weaves structure- Sharon Alderman-Inter weave Press

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	05	15
2	05	15
3	05	15
4	04	15
5	05	10
6	04	15
Total	**28**	**100**

THEORY	4.5 TEXTILE CHEMICAL PROCESSING (PE-1)	L	T	P
		2	-	-

COURSE OBJECTIVES:

The fabrics prepared go under variety of chemical processing before it reaches the hands of consumer. The processes have different objectives, but they are important for quality and aesthetic sense added to the fabric so is this paper here.

LEARNING OUTCOMES:

After studying this course, the students will be able to:

- Understand the different Preparatory Process Required for dyeing of textile Materials.
- Understand the different Dyeing Process Required for textile Materials.
- Understand the different Printing Process Required for fabrics.

COURSE CONTENTS

Unit – I: Preparatory Process (08 Periods)

General Introduction of following:

1. Impurities in raw cotton, jute, wool and silk, their removal.,
2. Cropping, Shearing and Gas Singeing
3. Desizing.,
4. Scouring of cotton, Wool.
5. Bleaching of cotton with Sodium Hypochlorite and Hydrogen peroxide.,
7. Carbonization of wool.,
8. Degumming of silk.,

Unit – II: Mercerization (03 Periods)

1. Mercerization Object.
2. Mercerization process for yarn and cloth.
3. Physical changes in fibers after mercerization.

Unit– III: Dyeing (08 Periods)

1. Classification of dyes according to their mode of application.
2. Dyeing of cotton with direct, Sulphur, Vat, reactive.
3. Dyeing of wool and silk with Acid dyes.
4. Dyeing of Polyester with disperse dyes.
5. Dyeing of acrylics with modified basic dyes.
6. Basic idea about dope dyeing.

Unit– IV: Printing (05 Periods)

1. Object of Printing & classification.
2. Methods of printing: Block, screen and spray printing.
3. Styles of printing: Elementary knowledge of direct. resists, discharge styles of printing.

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Unit– V: Finishing **(04 Periods)**

Object of Finishing - Elementary knowledge of different types of finishing processes e.g. Crease-Resistant Finish, Watre repellent Finish, Antimicrobial Finish, Soil repellant finish

INSTRUCTIONAL STRATEGY

Teacher should take theory lecture, demonstration of concepts and prototype

MEANS OF ASSESSMENT

- Assignments and quiz/class tests, mid-term and end-term written tests
- Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva voce.

RECOMMENDED BOOKS:

1. Basics of Textile Chemical Processing
2. Textile Chemical Processing (Central Board of Secondary Education in Collaboration with NIFT)
3. Bleaching, Mercerizing & Dyeing of cotton materials by R.S. Prayag

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (periods)	Marks Allotted (%)
I	08	25
II	03	10
III	08	30
IV	05	20
V	04	15
Total	**28**	**100**

THEORY	4.5 PRINCIPLE OF DESIGN AND COLOR (PE-2)	L	T	P
		2	-	-

COURSE OBJECTIVES:

Adding aesthetic sense to the fabric by use of colour and development of designs to make it attractive to the consumer is most essential activity in textile manufacturing. This paper aims to equip the incumbent with principles and practices relevant to achieve this goal.

LEARNING OUTCOMES:

After studying this course, the students will be able to:

- Draw and sketch flowers, buds and other figures on fabric.
- Understand the light theory and pigment theory.
- Understand primary and secondary colours.
- Understand colour harmony, tints and hues.
- Understand the weave effect.

COURSE CONTENTS

Unit – I: Drawing and Sketching (06 Periods)

1. Drawing, tracing, enlarging reducing and transferring of simple and elaborate figures.
2. Sketching of flowers, buds, leaves, geometrical figures and their assembly to obtain an all over effect in fabric.
3. Preparation of sketches for stripped, check, spotted geometric and diaper patterns, suitable for fabrics.

Unit – II: Light Theory of colours (04 Periods)

1. Fundamentals of Light Theory of colours.
2. Spectrum of colors i.e. Visible Spectrum, Absorption spectrum and Emission Spectrum.
3. Primary Colors, Secondary colors, Complementary Colors, Chromatic Circle.

Unit– III: Pigment Theory of Colors (06 Periods)

1. Fundamentals of Pigment theory of colour.
2. Classification of colours, Primary, Secondary and Tertiary colours.
3. Modification of colours. Color Wheel
4. Colour contrast, Monochromatic Contrast, Polychromatic Contrast, Simultaneous Contrast, Successive Contrast, contrast of Hue, Contrast of Tone
5. Colour harmony, Harmony of Analogy , Harmony of Contrast.
6. tints, shades and broken hues.

Unit– IV: Application of colour and weave effect. (06 Periods)

1. Simple Weave and color effect
2. Compound Weave and color effect

Unit– V: Development of Textile Pattern (06 Periods)

1. Development of textile patterns on different basis such as drop, turn over, drop reverse etc. Unit and repeat compared.
2. Transfer of design of motives on graph paper and pilling of weaves according to structure/texture.

INSTRUCTIONAL STRATEGY

Teacher should take theory lecture, demonstration of concepts and prototype

MEANS OF ASSESSMENT

- Assignments and quiz/class tests, mid-term and end-term written tests
- Actual laboratory and practical work, model/prototype making, assembly and disassembly exercises and viva voce.

RECOMMENDED BOOKS:

1. Principle of Design- Watson

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (periods)	Marks Allotted (%)
I	06	10
II	04	20
III	06	30
IV	06	20
V	06	20
Total	**28**	**100**

PRACTICAL	4.6 YARN TECHNOLOGY-II	L	T	P
		-	-	4

LIST OF PRACTICALS (To perform any Ten practical)

1. Operate the doubling machine and produce folded yarn and to calculate twist constant, TPI, Spindle speed and production.
2. To Calculation twist constant and draft constant and production from machine particulars of ring frame.
3. Operate the machine and produce yarn.
4. Gauge the Spindle and Lappets.
5. Carryout the maintenance of ring frame practically.
6. To calculate spindle speed , Twist Constt, TPI & Production of ring doubler.
7. To learn about making spin plan, taking breaking study, snap study of idle spindles, labour allocation in Ring frame dept on assumption basis.
8. To learn the changing the draft change pinion and twist wheel, traveller and ratchet wheel at ring frames and mount the spindle tape and set it for 'S' and 'Z' twist.
9. Carry out the maintenance of ring frame practically.
10. To calculate spindle speed , Twist Constant, TPI & Production of ring doubler.
11. To study traveler speed & doff weight of Ring frame.
12. To Study The Ring Frame Breakges.
13. To study traveller speed & doff weight of Ring frame.

PRACTICAL	4.7 FABRIC TECHNOLOGY-II	L	T	P
		-	-	4

LIST OF PRACTICALS (To perform any Ten practical)

1. Practice of beam gaiting.
2. Practice of fixing and tuning the whole loom to run for perfect weaving.
3. Dismantling of various parts of dobby, their sketching and resetting.
4. Timing and adjustment of dobby for giving connection of T lever, Arm and Eccentric provided on the shaft. Barrel setting.
5. Practice of preparing dobby lattice.
6. Practice of operating loom fitted with dobby and weaving of cloth.
7. Practice of mending broken ends after levelling the healds.
8. Finding and removing faults in dobby weaving.
9. Fixing and tuning of drop box motion.
10. Chain preparation for different weft plans for drop box loom.
11. Sketching of various parts of drop box motion.
12. Sketching various parts of SLSC, DLSC and DLDC Jacquard
13. Practicing the Piano Card Punching Machine for preparation of punched card.

THEORY	4.8 RENEWABLE ENERGY TECHNOLOGIES (OE 2)	L	T	P
		2	-	-

COURSE LEARNING OBJECTIVES:

The objective of this course is to provide a comprehensive understanding of the current and future global energy scenario, with a focus on non-conventional energy sources. It aims to introduce the fundamentals of solar and wind energy systems, explore various forms of bioenergy and their applications, and help students identify and evaluate different alternative energy sources.

LEARNING OUTCOMES:

Upon completion of the course the students will be able to

1. Understand the present and future energy scenario of the world.
2. Understand various methods of solar energy harvesting.
3. Identify various wind energy systems.
4. Evaluate appropriate methods for Bio energy generations from various Bio wastes.
5. Identify suitable energy sources for a location.

COURSE CONTENT

Unit-1: (6 Periods)

Introduction: World Energy Use; Reserves of Energy Resources; Environmental Aspects of Energy Utilisation; Renewable Energy Scenario in India and around the World; Potentials; Achievements / Applications; Economics of renewable energy systems.

Unit-2: (6 Periods)

Solar energy: Solar Radiation; Measurements of Solar Radiation; Flat Plate and Concentrating Collectors; Solar direct Thermal Applications; Solar thermal Power Generation Fundamentals of Solar Photo Voltaic Conversion; Solar Cells; Solar PV Power Generation; Solar PV Applications.

Unit-3: (5 Periods)

Wind Energy: Wind Data and Energy Estimation; Types of Wind Energy Systems; Performance. Site Selection; Details of Wind Turbine Generator; Safety and Environmental Aspects.

Unit-4: (5 Periods)

Bioenergy: Biomass direct combustion; Biomass gasifiers; Biogas plants; Digesters; Ethanol production; Bio diesel; Cogeneration; Biomass Applications.

Unit-5: (6 Periods)

Other Renewable Energy Sources: Tidal energy; Wave Energy; Open and Closed OTEC Cycles; Small Hydro-Geothermal Energy; Hydrogen and Storage; Fuel Cell Systems; Hybrid Systems.

INSTRUCTIONAL STRATEGY

- Teachers should focus on conceptual clarity.
- An industrial visit can be organized in relevant industries. Audio-visuals aids should be used to teach.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests
- Seminar, Presentation, Viva-voce.

REFERENCE BOOKS:

1. O.P. Gupta, Energy Technology, Khanna Publishing House, Delhi (ed. 2018)
2. Renewable Energy Sources, Twidell, J.W. & Weir, A., EFN Spon Ltd., UK, 2006.
3. Solar Energy, Sukhatme. S.P., Tata McGraw Hill Publishing Company Ltd., New Delhi, 1997.
4. Renewable Energy, Power for a Sustainable Future, Godfrey Boyle, Oxford University Press, U.K., 1996.
5. Fundamental of Renewable Energy Sources, GN Tiwari and MK Ghoshal, Narosa, New Delhi, 2007.
6. Renewable Energy and Environment-A Policy Analysis for India, NH Ravindranath, UK Rao, B Natarajan, P Monga, Tata McGraw Hill.
7. Energy and The Environment, RA Ristinen and J J Kraushaar, Second Edition, John Willey & Sons, New York, 2006.
8. Renewable Energy Resources, JW Twidell and AD Weir, ELBS, 2006.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Periods)	Marks Allotted (%)
1.	06	20
2.	06	20
3.	05	20
4.	05	20
5.	06	20
Total	28	100

THEORY	4.8 ENERGY EFFICIENCY AND AUDIT (OE-2)	L	T	P
		2	-	-

COURSE LEARNING OBJECTIVES:

This course aims to develop the competency to undertake energy efficiency measures and conduct energy audits through practical and industry-relevant learning experiences.

LEARNING OUTCOMES:

Upon completion of the course the students will be able to

- Undertake energy efficient activities
- Use energy efficient pumps, compressors and blowers
- Use energy efficient Air Compressors and DG sets
- Use energy efficient Lighting Systems
- Apply energy efficient electrical machines.
- Use Co-generation and relevant tariff for reducing losses in facilities.

COURSE CONTENT

Unit – 1 **(4 Periods)**

Introduction to Energy Efficiency
Energy Scenario: Energy demand and supply, National scenario.
Energy Efficiency and Energy Conservation; concepts
Indian Electricity Act 2001; relevant clauses of energy conservation
BEE and its Roles
Star Labelling: Need and its benefits.

Unit – 2 **(5 Periods)**

Pumping Systems, Fans and Blowers
Factors affecting pump performance
Efficient Pumping system operation
Energy conservation opportunities in Pumping systems
Fan types, flow control strategies
Fan performance Assessment
Energy Conservation opportunities in Pumping systems
Tips for energy saving in fans and blowers

Unit – 3 **(5 Periods)**

Air Compressors and Diesel Power Generator sets
Classification of compressors
Pneumatic System components
Effect of various parameters on efficiency of Compressor
Capacity control of Compressors
Checklist for Energy Efficiency in Compressed air systems
Operating guidelines for diesel generator, operational factors
Effects of improper ventilation of genset
Energy saving measures for DG sets

Unit –4 **(4 Periods)**

Energy Conservation in Lighting System
Replacing Lamp sources
Using energy efficient luminaries

Using light controlled gears
Installation of separate transformer / servo stabilizer for lighting
Periodic survey and adequate maintenance programs
Innovative measures of energy savings in lighting
Open Elective Courses 454

Unit– 5 **(6 Periods)**

Energy Efficient Electrical Machines
Need for energy conservation induction motor and transformer
Energy conservation techniques in induction motor by:
Energy conservation techniques in Transformer
Energy Conservation Equipment: Soft starters, Automatic star delta converter, Variable Frequency Drives, Automatic p. f. controller (APFC)
Energy efficient motor; significant features, advantages, applications and Limitations
Energy efficient transformers, amorphous transformers; epoxy Resin cast transformers / Dry type of transformer
Aggregated Technical and commercial losses (ATC), Technical losses; causes and measures to reduce, Commercial losses: pilferage, causes and remedies
Application of tariff system to reduce energy bill
Co-generation and Tariff; concept, significance for energy conservation

Unit– 6 **(4 Periods)**

Energy Audit of Electrical Systems
Energy audit (definition as per Energy Conservation Act)
Energy audit instruments and their use
Questionnaire for energy audit projects
Energy flow diagram (Sankey diagram)
Simple payback period, Energy Audit procedure (walk through audit and detailed audit).
Energy Audit report format.

INSTRUCTIONAL STRATEGY

- Teachers should focus on conceptual clarity.
- An industrial visit can be organized in relevant industries. Audio-visuals aids should be used to teach.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests
- Seminar, Presentation, Viva-voce.

REFERENCE BOOKS:

1. Guidebooks No. 1 and 3 for National Certification Examination for Energy Managers and Energy Auditors, Bureau of Energy Efficiency (BEE), Bureau of Energy Efficiency (Statutory body under Ministry of Power, Government of India) (Fourth Edition 2015).
2. O.P. Gupta, Energy Technology, Khanna Publishing House, Delhi, Edition 2018, (ISBN: 978-93-86173-683).
3. Henderson, P. D., India - The Energy Sector, University Press, Delhi, 2016. ISBN: 978-0195606539
4. Turner, W. C., Energy Management Handbook, Fairmount Press, 2012, ISBN 9781304520708

5. Sharma, K. V., Venkataseshaiah; P., Energy Management and Conservation, I K International Publishing House Pvt. Ltd; 2011 ISBN 9789381141298
6. Mehta,V. K., Principles of Power System, S. Chand andCo.New Delhi, 2016, ISBN 9788121905947
7. Singh, Sanjeev; Rathore, Umesh, Energy Management, S K KatariaandSons, New Delhi ISBN-13: 9789350141014.
8. Desai, B. G.; Rana, J. S.; A. Dinesh, V.; Paraman, R., Efficient Use and Management of Electricity in Industry, Devki Energy Consultancy Pvt. Ltd.
9. Chakrabarti, Aman, Energy Engineering and Management, e-books Kindle Edition

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Periods)	Marks Allotted (%)
1.	04	15
2.	05	17
3.	05	17
4.	04	15
5.	06	21
6.	04	15
Total	28	100

AUDIT COURSE	4.9 ESSENCE OF INDIAN KNOWLEDGE AND TRADITION	L	T	P
		2	-	-

COURSE OBJECTIVES:

Understand the fundamental aspects of the Indian Knowledge System, its integration with modern science, principles of Yoga and holistic healthcare, and practical applications in contemporary contexts.

LEARNING OUTCOMES

Upon completion of the course, the student will be able to demonstrate knowledge of the following topics:

- Overview, importance, and relevance of the Indian Knowledge System, including Vedas, Upvedas, Vedangas, and Upangas.
- Relevance of science and spirituality, and contributions of ancient Indian science and technology.
- Basic principles of Yoga, benefits of holistic healthcare, and integration with modern healthcare.
- Practical applications and case studies of the Indian Knowledge System's relevance today.

COURSE CONTENTS

Unit 1: Introduction to Indian Knowledge System (16 Periods)

Overview of Indian Knowledge System

Importance and relevance

1. Introduction to the Vedas
2. Upavedas
3. Vedangas
4. Upangas

Unit 2: Modern Science and Indian Knowledge System (06 Periods)

1. Relevance of Science and Spirituality,
2. Science and Technology in Ancient India,

Unit 3: Yoga and Holistic Healthcare (04 Periods)

1. Basic principles of Yoga
2. Benefits of holistic healthcare practices
3. Integration with modern healthcare

Unit 4: Case Studies / Assignment (02 Periods)

Practical Applications / Case studies demonstrating the relevance of Indian Knowledge System in modern times.

INSTRUCTIONAL STRATEGY

This being one of the most important subject, teacher should lay emphasis on developing basic understanding of various concepts and principles and procedures involved herein. Teacher should involve students in different practices like meditation, yoga camp etc.

MEANS OF ASSESSMENT

- Viva -Voce Exam

RECOMMENDED BOOKS

1. Cultural Heritage of India-Course Material, V. Sivaramakrishna, Bharatiya Vidya Bhavan, Mumbai, 5th Edition, 2014
2. Modern Physics and Vedant, Swami Jitatmanand, Bharatiya Vidya Bhavan
3. Science of Consciousness Psychotherapy and Yoga Practices, R N Jha, Vidyanidhi Prakasham, Delhi, 2016.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	**Time allotted (Periods)**	**Marks Allotted (%)**
1.	16	50
2.	06	20
3.	04	15
4.	02	15
Total	**28**	**100**

8. GUIDELINES FOR ASSESSMENT OF STUDENT-CENTRED ACTIVITIES (SCA)

It was discussed and decided that the maximum marks for SCA should be 50 as it involves a lot of subjectivity in the evaluation. The marks may be distributed as follows

I. 15 Marks for general behaviour and discipline
(by HODs in consultation with all the teachers of the department)

II. 10 Marks for attendance as per following:
(by HODs in consultation with all the teachers of the department)
a) 75 - 80% 06 Marks
b) 80 - 85% 08 Marks
c) Above 85% 10 Marks

III. 25 Marks maximum for Sports/NCC/Cultural/Co-curricular/NSS activities as per following:
(by In-charge Sports/NCC/Cultural/Co-curricular/NSS)
a) 25 - State/National Level participation
b) 20 - Participation in two of above activities
c) 15 - Inter-Polytechnic level participation

9. RESOURCE REQUIREMENT

A. PHYSICAL RESOURCES

a) Space requirement

Norms and standards laid down by All India Council for Technical Education (AICTE) are to be followed to work out space requirement in respect of class rooms, tutorial rooms, drawing halls, laboratories, space required for faculty, student amenities and residential area for staff and students.

b) Equipment Requirement:

Following Laboratories are required for diploma programme in Textile Technology (3rd and 4th Semester):

TEXTILE TESTING LAB

S.No	Name of Equipment	No.	@Rs.	Amt.in Rs.
1.	Baer Sorter (For Fibre Length) Acrylic Transparent Sheet - 6"X8"X2 pices, 3"X8"X2 pcs Fibre Mounting Templest 6"X8"X2 pices, 3"X8"X2 pcs with tweezers, velvet pad, scales, plan chass with all complete accessories or Latest Configuration	2	35000	35000
2.	Micro scope Digital Mocro scope - Microscope & Ends Counting Equipments-Magnifying Power 5X,10X,20X,40X,100X lenses Trinocular biological microscope with fibre cross section kit, high resolution CCD camera and imaging software with measurement facilities, Scope of use section of fibre or yarn, analysis of any fibre, yarn and fibre Range : 5X,10X,20X,450X,100X / as per requirements, Focus : Adjustable, Lights - White, Blue, Yellow, Upper & Lower, Supply -220 V AC supply Single Phase with all complete accessories Or Latest Configuration	2	65000	65000
3.	Moisture Meter	1	16000	16000
4.	Wrap reel	2	40000	80000
5.	Wrap Block	2	9500	19000
6.	Beesley Balance	4	7000	28000
7.	Quadrant Balance	2	6000	12000
8.	Lea Strength Tester	1	75000	75000
9.	Single Thread Tester (Digital)	1	100000	100000
11.	One Inch Twist Tester	2	9800	19600

12.	Take Up Twist Tester Yarn test length : 25 mm to 500 mm adjustable (Metric unit) Or 1" to 20" Maximum adjustable (imperial unit), The test length is automatically taken into account for calculation and final reading is displayed directly in TPM/TPL Range :Upto 60TPL Resolution :1 TPM or 0.01 TPI Motor Speed: Upto 1500 RPM Clamps : Spring loaded clamps at motor end for easy clamping of Yarn Averaging : Reading of at least 10 samples can be stored and average TPM/TPI value is calculated and digital display with pre set device. Supply : 220 V AC, single phase Suitable for S/Z type of twisted yarn with reset device. Tension weight upto 100 gm adjustable. Yarn spool mounting arrangement at one end of the twist tester with all complete accessories or Latest Configuration	2	28500	57000
13.	Fabric Strength Tester (Tensile Strength)	1	80000	80000
14.	Tearing Strength Tester	1	35000	35000
15.	Bursting Strength Tester	1	35000	35000
16.	Abrasion Resistance Tester(Martindle Type)	1	75000	75000
17.	Laundro meter (For washing fastness testing)	1	80000	80000
18.	Crocko Meter	1	10000	10000
19.	Digital Fibro graphMeasuring Principle-Optical Measuring Range-12.0 to 45.0 mm Measuring Accuracy - +/- 0.1 mm Result Output-2.5% SL,50% SL & UR % Front End Language-English Applicable Standard-ASTM	1	320000	320000

	D5332,ISO2648 & IS233 Power Supply-Single Phase 220V AC			
20.	Uster Evenness Tester	1	2000000	2000000
21.	Trash Analyser	1	150000	150000
22.	Conditioning Oven 220 V With capability of maintaining temperature up to 100oC and facility for smoth variation of temperature inside 27 liter.	1	98500	98500
23.	Stelometer (For bundle Strength)	2	150000	300000
24.	Crease Recovery Tester Size of the Test Specimen - 40mm X 15mm, Crease Load : 1Kg.(Stainless Steel), Angle measurement : On an Engraved circular scale graduated in 1 deg., Scale measurement : 0-180 with all complete accessories or Latest Configuration	2	15000	30000
25.	Water Repellency Tester	1	80000	80000
26.	Pilling Tester	1	30000	30000
28.	Air Permeability Tester	1	60000	60000
29.	Sheffield Micronaire with compressor (For Fibre Fineness)	1	150000	150000
31.	Miscellaneous Items-Thermometers, Whirling Hydrometer, Dry & Wet bulb thermometer, Physical Balance, 1.5 ton Air conditioner for atmosphere control etc.			
32.	Classimate (Yarn faults finding equipment)	1		1200000
34.	Sublimation fastness tester	1	100000	100000
35.	Round Sample of GSM with Electronic balance	1	20000	20000
36.	Stiffness Tester	1	15000	15000
37.	Drape meter	1	25000	25000
38.	Fabric Thickness Tester	1	8000	8000
39.	A.S.T.M. Cards For Threads/Inch	1		

SPINNING LAB

S.No.	Name of Equipment	No.	@ Rs.	Amt.in Rs.
1.	Blow Room Line With Six Beating Points (Lab Model) Latest Lab Model of blaow room line of 10 inch width or more complete with hopper feeder, Scutcher, beaters with adjustment grid bars, lattic, Krischner neater, Feed regulatory system, calendar rollers, lap rollers, lap tray with electric control pannel, beating point = 4.5 to 6 with complete accessories or Latest Configuration	1	5000000	5000000
2.	Model of mini carding plant 250 mm working width 250 mm cylinder, doffer, feed roller,opening roller, striping roller, crush roller stainless undercasing, takeup drum suitable for feeding, miniature draw frame with gear and pulleys to drive feed roller, cyliner and doffer and other accessories, Mechanical type possibility of processing 50 gms. per batch 10 "width, metallic wire clothing with complete accessories, Microprocessor based indidual drive or Latest Configuration	1No.	800000	800000
3.	Draw Frame : Having 3 over 3 drafting arrangement to process the silver from miniature carding machine with individual AC variable speed motors with change grars to vary the speeds of front roller, middle and back roller for different Total Draft and break Draft inclusive of motor, rpm indicators control system and other accessories Mechanical type single delivery, 3 over3 drafting arrangement, range 5-15 Draft Microprocessor based or Latest Configuration	1No.	800000	8,00,000
4.	High Speed Simplex (Lab Model) Latest Lab Model Range :6-12 Spindle Suitable for 110 mm dia package Draft Range=6-18, 3 roller apron dratingarragement SKF PK 1500, individual AC variable speed motors with control system with automatic stop motion, Inching mechanism, 100 empty PP bobbins with complete accessories and pinion according to draft change with all complete accrssories or Latest Configuration	1	480000	480000
5.	Ring Frame Ring Spinning Frame : No. of Spindle6-12, mechanical speed 25000 rpm, ring dia - 38 mm, 70mm gauge, 180 mm lift, SKF PK 2025/2035, 3 over 3 drafting arrangement with short cradles, for gearing arrangement to change the total draft, Break draft and TPI with	1	850000	850000

	change gears and other accessories. Mechanical draft 10-50 Microprocessor based or Latest Configuration			
6.	Sliver Lap Machine	1	250000	250000
7.	Ribbon Lap Machine	1	250000	250000
8.	Comber 6/8 Heads	1	800000	800000
9.	Parallel Winding Machine(24 Drums) (Lab Model) Cheese winding :Range 4-8 or more drum, Speed Range-600-800 y.p.m., Optical cleaner on individual spindle, Steel drum/ Bakelite drum as per parallel winding, 220V, Single phase motor, 100pp cheeses with all complete assessories or latest configuration	1	400000	400000
10.	Yarn Doubling Machine (Lab Model)	1	275000	275000
11.	Hank Reeling Machine	1	25000	25000
12.	Two For One Twister(T.F.O.) TFO type, No. of spindle= range 4-8, 230 mm guage, 150 mm pot dia, suitable for cheese of 170 mm traverse, twist range=3.0 to 45.0, count range 2/8's to 2/80's Ne, Tangential belt drive for S & Z twist both, with automatic shop motorn and other complete accessories, 100 PP empty package with all complete accessories or Latest Configuration	1	600000	600000
13.	Stripping Roller (For Card)	1	5000	5000
14.	Grinding Roller (Transverse wheel Grinder)	1	5000	5000
15.	Metallic Wire Mounting Equipment (With Butt Welder)	1	20000	20000
17.	Assembly Winder	1	250000	250000
18.	Open end spinning M/c of Twelve rotors (Lab Model) Having Range 4-8 head rotor guage-230 mm having 48 mm rotor with OK39/40 opening rollers, automatic stop motion R4/10 navels, built in automatic indicators and quick response sensors to monitor yarn continuty and sliver, trash separator and discharge tunel for better cleaning, Feeding can size of 14" X 42" and take up package cone and cheese both with individual motors with pully to change draft and twist with motors. Electrical PLC system, Computer, UPS, Control system, Dreft range suitable for 2' to 24's and other all complete accessories, draft range-50-200 user friendly menu driven software or Latest Configuration	1	750000	750000

NOTE:

1. Indian make working laboratory models for the costly equipment mentioned above be purchased if available.

WEAVING LAB

S.No.	Name of Equipment	No.	@ Rs.	Amt.in Rs.
1.	Warp Winding Machines			
	A. Ordanary Machine with 10 Heads	1	75000	75000
	B. Automatic Winding Machine with 10 Heads	1	800000	800000
2.	Pirn Winding Machine with 4 Heads	1	75000	75000
3.	Warping Machines			
	A. Beam Warping Machine (High Speed)	1	300000	300000
	B. Sectional Warping Machine	1	175000	175000
4.	Working Model of Sizing Plant	1	500000	500000
5.	Drawing and Denting Frames (cap. 200e nds) Stainless Screen Frame, Capacity 3200 ends with all Complete Accessories or Latest Configuration.	2	10000	20000
6.	Beam Knotting Machine	1	80000	80000
7.	Plane Looms			
	A. Plain Loom For Plain Tappet	1	70000	70000
	B. Plain Loom For Other Weave Tappets	1	100000	100000
8.	Dobby Looms			
	A. Single (Acting) Dobby Loom	1	200000	200000
	B. Double Acting (Double Lift) Dobby Loom	1	200000	200000
9.	Jacquard Looms			
	A. Loom with Single Lift Single Cylinder Jacquard	1	250000	250000
	B. Loom With Single Lift Double Cylinder Jacquard	1	250000	250000
	C. Loom With Double Lift Double Cylinder Jacquard	1	250000	250000
10.	Automatic Weaving Machines			
	A. Automatic Pirn Changing Loom	1	300000	300000
	B. Automatic Shuttle Changing Loom	1	300000	300000
11.	Shuttleless Weaving Machines			
	A. Gripper Type Shuttleless Loom	1	3500000	3500000
	B. Air Jet Weaving Machine	1	1200000	1200000
	C. Water Jet Weaving Machine	1	1200000	1200000
12.	Other Weaving Machines			
	A. Hand Looms	2	40000	80000
	B. Loom With Circular Multiple Box Motion.	1	150000	150000
	C. Loom With Drop Box Multiple Box	1	150000	150000
	D. Loom With Terry Motion	1	200000	200000
	E. Loom With Pick At Will Motion	1	150000	150000
13.	Card Cutting Machine	1	40000	40000
14.	Knitting Machines			
	A. Flat Knitting Machine	1	75000	75000
	B. Circular Knitting Machine	1	125000	125000
15.	Sewing Machine	6	10000	60000
16.	Model of Rapier Looms 20" with winding and warping unit complete set	1	3000000	3000000

10. EVALUATION STRATEGY

INTRODUCTION

Evaluation plays an important role in the teaching-learning process. The major objective of any teaching-learning endeavour is to ensure the quality of the product which can be assessed through learner's evaluation.

The purpose of student evaluation is to determine the extent to which the general and the specific objectives of curriculum have been achieved. Student evaluation is also important from the point of view of ascertaining the quality of instructional processes and to get feedback for curriculum improvement. It helps the teachers in determining the level of appropriateness of teaching experiences provided to learners to meet their individual and professional needs. Evaluation also helps in diagnosing learning difficulties of the students. Evaluation is of two types: Formative and Summative (Internal and External Evaluation)

Formative Evaluation

It is an on-going evaluation process. Its purpose is to provide continuous and comprehensive feedback to students and teachers concerning teaching-learning process. It provides corrective steps to be taken to account for curricular as well as co-curricular aspects.

Summative Evaluation

It is carried out at the end of a unit of instruction like topic, subject, semester or year. The main purpose of summative evaluation is to measure achievement for assigning course grades, certification of students and ascertaining accountability of instructional process. The student evaluation has to be done in a comprehensive and systematic manner since any mistake or lacuna is likely to affect the future of students.

In the present educational scenario in India, where summative evaluation plays an important role in educational process, there is a need to improve the standard of summative evaluation with a view to bring validity and reliability in the end-term examination system for achieving objectivity and efficiency in evaluation.

STUDENTS' EVALUATION AREAS

The student evaluation is carried out for the following areas:

- Theory
- Practical Work (Laboratory, Workshop, Field Exercises)
- Project Work
- Professional Industrial Training

A. Theory

Evaluation in theory aims at assessing students' understanding of concepts, principles and procedures related to a course/subject, and their ability to apply learnt principles and solve problems. The formative evaluation for theory subjects may be caused through

sessional /class-tests, home-assignments, tutorial-work, seminars, and group discussions etc. For end-term evaluation of theory, the question paper may comprise of three sections.

Section-I

It should contain objective type items e.g. multiple choice, matching and completion type. Total weightage to Section-1 should be of the order of 20 percent of the total marks and no choice should be given in this section. The objective type items should be used to evaluate students' performance in knowledge, comprehension and at the most application domains only.

Section-II

It should contain short answer/completion items. The weightage to this section should be of the order of 40 percent of the total marks. Again, no choice should be given in section-II

Section-III

It may contain two to three essay type questions. Total weightage to this section should be of the order of 40 percent of the total marks. Some built-in, internal choice of about 50 percent of the questions set, can be given in this section

Table: Suggested Weightage to be given to different ability levels

Abilities	**Weightage to be assigned**
Knowledge	10-30 percent
Comprehension	40-60 percent
Application	20-30 percent
Higher than application i.e. Analysis, Synthesis and Evaluation	Upto 10 percent

B. Practical Work

Evaluation of students performance in practical work (Laboratory experiments, Workshop practicals/field exercises) aims at assessing students ability to apply or practice learnt concepts, principles and procedures, manipulative skills, ability to observe and record, ability to interpret and draw conclusions and work related attitudes. Formative and summative evaluation may comprise of weightages to performance on task, quality of product, general behaviour and it should be followed by viva-voce.

C. Project Work

The purpose of evaluation of project work is to assess students ability to apply, in an integrated manner, learnt knowledge and skills in solving real life problems, manipulative skills, ability to observe, record, creativity and communication skills. The formative and summative evaluation may comprise of weightage to nature of project, quality of product, quality of report and quality of presentation followed by viva-voce.

D. Professional Industrial Training

Evaluation of professional industrial training report and viva-voce/ presentation aims at assessing students' understanding of materials, industrial processes, practices in the industry/field and their ability to engage in activities related to problem-solving in industrial setting as well as understanding of application of learnt knowledge and skills in real life situation. The formative and summative evaluation may comprise of weightages to performance in testing, general behaviour, quality of report and presentation during viva-voce.

11. RECOMMENDATIONS FOR EFFECTIVE CURRICULUM IMPLEMENTATION

This curriculum document is a Plan of Action and has been prepared based on exhaustive exercise of curriculum planning and design. The representative sample comprising selected senior personnel (lecturers and HODs) from various institutions and experts from industry/field have been involved in curriculum design process.

The document so prepared is now ready for its implementation. It is the faculty of polytechnics who have to play a vital role in planning instructional experiences for the courses in four different environments viz. class-room, laboratory, library and field and execute them in right perspective. It is emphasized that a proper mix of different teaching methods in all these places of instruction only can bring the changes in stipulated students behaviour as in the curriculum document. It is important for the teachers to understand curriculum document holistically and further be aware of intricacies of teaching-learning process (T-L) for achieving curriculum objectives. Given below are certain suggestions which may help the teachers in planning and designing learning experiences effectively. These are indicative in nature and teachers using their creativity can further develop/refine them. The designers of the programme suggest every teacher to read them carefully, comprehend and start using them.

(A) Broad Suggestions:

1. Curriculum implementation takes place at programme, course and class-room level respectively and synchronization among them is required for its success. The first step towards achieving synchronization is to read curriculum document holistically and understand its rationale and philosophy.

2. An academic plan needs to be prepared and made available to all polytechnics well in advance. The Principals have a great role to play in its dissemination and, percolation upto grass-root level. Polytechnics, in turn are supposed to prepare institutional academic plan.

3. HOD of every Programme Department along with HODs and incharges of other departments are required to prepare academic plan at department level referring to institutional academic plan.

4. All lecturers/Senior lecturers are required to prepare course level and class level lesson plans referring departmental academic plan.

(B) Course Level Suggestions

Teachers are educational managers at class room level and their success in achieving course level objectives lies in using course plan and their judicious execution which is very important for the success of programme by achieving its objectives.

Polytechnic teachers are required to plan various instructional experiences viz. theory lecture, expert lectures, lab/workshop practicals, guided library exercises, field visits, study tours, camps etc. In addition, they have to carry out progressive assessment of theory, assignments, library, practicals and field experiences. Teachers are also required to do all these activities within a stipulated period of time. It is essential for them to use the given time judiciously by planning all above activities properly and ensure execution of the plan effectively.

Following is the gist of suggestions for subject teachers to carry out T-L process effectively:

1. Teachers are required to prepare a course plan, taking into account departmental academic plan, number of weeks available and courses to be taught.

2. Teachers are required to prepare lesson plan for every theory class. This plan may comprise of contents to be covered, learning material for execution of a lesson plan. They may follow steps for preparing lesson plan e.g. drawing attention, state instructional objectives, help in recalling pre-requisite knowledge, deliver planned subject content, check desired learning outcomes and reinforce learning etc.

3. Teachers are required to plan for expert lectures from field/industry. Necessary steps are to plan in advance, identify field experts, make correspondence to invite them, take necessary budgetary approval etc.

4. Teachers are required to plan for guided library exercises by identification of course specific experience requirement, setting time, assessment, etc. The assignments and seminars can be thought of as terminal outcome of library experiences.

5. Concept and content-based field visits may be planned and executed for such content of course which is abstract in nature and no other requisite resources are readily available in institute to impart them effectively.

6. There is a dire need for planning practical experiences in right perspective. These slots in a course are the avenues to use problem-based learning/activity learning/ experiential learning approach effectively. The development of lab instruction sheets for the course is a good beginning to provide lab experiences effectively.

7. Planning of progressive assessment encompasses periodical assessment in semester, preparation of proper quality question paper, assessment of answer sheets immediately and giving constructive feedback to every student

8. The student-centred activities may be used to develop generic skills like task management, problem solving, managing self, collaborating with others etc.

9. Wherever possible, it is essential to use activity-based learning rather than relying on delivery based conventional teaching all the time.

10. Teachers may take initiative in establishing liaison with industries and field organizations for imparting field experiences to their students.

11. Students be made aware about issues related to ecology and environment, safety, concern for wastage of energy and other resources etc.

12. Students may be given relevant and well thought out project assignments, which are purposeful and develop practical skills. This will help students in developing creativity and confidence for their gainful employment.

13. A Project bank may be developed by the concerned department of the polytechnics in consultation with related Industry, research institutes and other relevant field organizations in the state.

12. LIST OF EXPERTS

Sr.No.	Name and Designation	Organization
1.	Anubha Gupta, Lecturer Textile Technology	GP Kanpur
2.	Sh. Santosh Kumar, Lecturer Textile Technology	GP Mau
3.	Sh. Palash Kumar Patra, Lecturer Textile Design	GP Kuru Pindra, Varanasi
4.	Sh.Vijay Pratap Singh, Ret. Senior Executive	Elgin Mill Ltd.
5.	Sh. R.K Shrivastav, Ret. Factory Manager	National Textile Corporation, Bhopal

13. EVALUATION SCHEME GUIDELINES: As Per AICTE ATTACHED (ANNEXURE- 1)

a. For Theory Courses:

(The weightage of Internal assessment is 40% and for End Semester Exam is 60%) The student has to obtain at least 40% marks individually both in internal assessment and end semester exams to pass.

b. For Practical Courses:

(The weightage of Internal assessment is 60% and for End Semester Exam is 40%) The student has to obtain at least 40% marks individually both in internal assessment and end semester exams to pass.

c. For Summer Internship / Projects / Seminar etc.

Evaluation is based on work done, quality of report, performance in viva-voce, presentation etc.

Note: The internal assessment is based on the student's performance in mid semester tests (two best out of three), quizzes, assignments, class performance, attendance, viva-voce in practical, lab record etc

ANNEXURE- 1

Evaluation Method For Practicum Based Course Paper (End Exam: PRACTICAL)

Internal Assessment (60 Marks)					**External Assessment (40 Marks)**
Mode	Sessional Exam (02 Best of 03)	Practical Test	Practical Documentation	Attendance and Assignment	Practical Exam
Portion	2 Units	100% Practical	All Practicals	All Units	All Practicals
Duration	1 Hr	3 Hrs	Regularly Monitored by Faculty	Regularly	4Hrs
Exam Marks	20	20	10	10	40
Tentative Schedule	6^{th} Week	12^{th} Week	13^{th} Week	$14^{th} – 15^{th}$ Week	Semester End Exam

NOTE:

1. Complete all exercises/experiments as outlined above and keep them for the practical test. The practical test should be conducted in accordance with the evaluation scheme. The best of the two practical tests will be evaluated internally for a total of 20 marks.

2. Maintain a practical file for each exercise. Submit the document for the practical file with a valid certificate (Progress Card) and Lab/classroom attendance and evaluate it for 10 marks.

3. Submit a micro project report along with the fabrication model/analysis report. The performance of each student in the group will be evaluated by the laboratory supervisor and an internal examiner evaluate it for 10 marks.

Evaluation Method For Practical Based Course Paper (End Exam: PRACTICAL)

Internal Assessment (60 Marks)					**External Assessment (40 Marks)**
Mode	Practical Test	Practical Test	Attendance and Practical Documentation	Micro Project	Practical Exam
Portion	50% Practicals	50% Practicals	All Practicals	All Practicals	All Practicals
Duration	3Hr	3 Hrs	Regularly	Regularly	4 Hrs
Exam Marks	20	20	20	20	40
Tentative Schedule	6^{th} Week	12^{th} Week	13^{th} Week	$14^{th} – 15^{th}$ Week	Semester End Exam

NOTE:

1. Complete all exercises/experiments as outlined above and keep them for the practical test. The practical test should be conducted in accordance with the evaluation scheme. The

best of the two practical tests will be evaluated internally for a total of 20 marks.

2. Maintain a practical file for each exercise. Submit the document for the practical file with a valid certificate (Progress Card) and Lab/class room attendance and evaluate it for 20 marks.

3. Submit a micro project report along with the fabrication model/analysis report. The performance of each student in the group will be evaluated by the laboratory supervisor and an internal examiner evaluate it for 20 marks.

Evaluation Method For THEORY Based Course Paper

Internal Assessment (40 Marks)					**External Assessment**
Mode	Sessional Exam-1	Sessional Exam-2	Sessional Exam-3	Attendance and Assignment	Written Exam
Portion	2 Units	2 Units	All Units	Regularly	All Units
Duration	1 Hr	1 Hr	1 Hr	1 Hr	3 Hrs
Exam Marks	10	10	10	10	60
Tentative Schedule	4^{th} Week	8^{th} Week	12-14^{th} Week	Regularly	Semester End Exam

Evaluation Method For Practicum Based Course Paper (End Exam: THEORY)

Internal Assessment (40 Marks)					**External Assessment (60 Marks)**
Mode	Sessional Exam (02 Best of 03)	Practical Test	Practical Documentation	Attendance and Assignment	Written Exam
Portion	2 Units	100% Practical	All Practicals	All Units	All Units
Duration	1 Hr	3 Hrs	Regularly Monitored by Faculty	Regularly	3 Hrs
Exam Marks	10	10	10	10	60
Tentative Schedule	6^{th} Week	12^{th} Week	13^{th} Week	14^{th} – 15^{th} Week	Semester End Exam