

**DEPARTMENT OF TECHNICAL EDUCATION (DIPLOMA SECTOR)
UTTAR PRADESH**

**CURRICULUM FOR DIPLOMA PROGRAMME
IN
TEXTILE TECHNOLOGY
(3rd to 4th Semester)**

=====

Semester System

=====



YEAR 2025-2026

Prepared By:

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

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PREFACE

An important issue generally debated amongst the planners and educators' 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. 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 cultures and environments together and giving rise to the concept of the 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 the 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 R Khan
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2. SALIENT FEATURES

- | | |
|--------------------------------------|---|
| 1. Name of the Programme | ➤ Diploma in Textile Technology |
| 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, U.P. |
| 4. Pattern of the Programme | ➤ Semester System |
| 5. Ratio between theory and Practice | ➤ 40% (Theory) / 60% (Practical) |

1) **Industrial Training/Internship:**

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

2) **Audit & Pathways:**

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) **Student Centered Activities:**

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) **Project work:**

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 FOR DIPLOMA HOLDER IN TEXTILE TECHNOLOGY

Keeping present scenario in view following employment opportunities are visualized in different sectors of employment for diploma holders in Textile Technology

(1) Manufacturing Industry

The Textile Technology diploma holder will be able to execute the following activities:

- Supervisor and managerial job in Man Made Fibre Production Industry.
- Production Supervisor in Cotton Ginning Industry
- Production Supervisor in Spinning Preparatory (blow room to Roving formation)
- Production Supervisor in Ring Frame and Post Spinning Department.
- Quality Assurance/Control in Spinning Mills
- Machine installation and maintenance in Spinning Mills.
- Assistance in Research and Development in Spinning and Weaving Mills.
- Assistance in Production Planning and Control in Spinning and Weaving Mill,
- Shop-floor Management Spinning and Weaving
- Production Supervisor in weaving Preparatory and Loom Shed.
- Inventory Management
- Marketing and Sales
- Quality Assurance/Control in Weaving Mills
- New Product Development in different types of fabric.
- Production Supervisor in Dyeing and Finishing Process.
- Textile testing Lab in charge
- Production Supervisor in Knitting Industry
- Garment/Apparel Production Management.
- Technical Textile Industry

(2) Government Departments such as DRDO, Central Silk Board, MSME, National Textile Corporation, Khadi Gramodyog, Ministry of Textiles, Handloom Development Commission, Weaver's Service Centre

- Lab Technician
- Research Assistant
- Cluster Development Officer
- Supervisor
- Handloom Development officer
- Weaver's Service Centre

(3) Self-Employment

- Start-up of handloom saree manufacturing Unit
- Khadi Yarn and Fabric Manufacturing Unit
- Trading Textile Accessories for garment
- Trading machine Spare parts.
- Trading of Fabric.
- Start-up of Garment Manufacturing Unit in small scale.

4. (A) PROGRAM OUTCOMES (POS)

PO1: Basics and Discipline specific Knowledge

Assimilate knowledge of basic mathematics, science, engineering fundamentals, and Textile Technology.

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 OUT COMES OF THE PROGRAM

After due completion of the course, a diploma holder in TEXTILE TECHNOLOGY will be able to:	
1.	Communicate effectively in English with others
2.	Apply basic principles of mathematics to solve engineering problems
3.	Apply basic principles of physics and chemistry to solve engineering problems
4.	Prepare computerized reports, presentations using IT tools and computer application software
5.	Prepare and interpret drawings of engineering components
6.	Use cutting tools and tooling for fabrication of jobs by following safe practices during work
7.	Use energy conservation methods in various systems
8.	Use appropriate procedures for preventing environmental pollution and energy conservation
9.	Differentiate Natural Fibre from Synthetic Fibre
10.	Analyze the Application area of different type of Fibres.
11.	Cultivate natural Fibre and synthesis of man-made Fibres.
12.	Handle the machinery related fibre production, spinning, weaving and dyeing
13.	Manipulate and control different machine setting in blow room, carding machine for optimum production and quality lap and sliver
14.	Control all the machine setting related yarn production.
15.	Identify different types of yarn.
16.	Set the Auto coner machine for desired yarn quality
17.	Prepare good quality weaver's beam for weaving process by fixing the machine parameter in warping and sizing machine.
18.	Decide to select gaiting and knotting process for weaving.
19.	Prepare new design and its draft plan and peg plan for fabric production on loom.
20.	Prepare drafting and peg plan for any kind of design.
21.	Supervise and control the machine parameters in loom shed for high production and quality.
22.	Grade the fabric produced in weaving for the buyer.
23.	Decide the finishing route for a greige fabric for particular end uses.
24.	Provide fabric constructions for particular end uses & Design on the fabric
25.	Decide dyeing and finishing recipes for color matching with sample.
26.	Standardized the fabric parameters after gone through physical and chemical testing.
27.	Operate all textile testing Instruments.
28.	Operate any types of shuttle and shuttle less loom i.e. projectile, rapier, jet looms etc.
29.	Produce advanced fabric structures on loom.
30.	Plan and execute given task/project as team member/leader
31.	Manage resources (Man, Machine and Material) effectively at the workplace
32.	Apply all the knowledge and skill gained through various courses in solving a live problem/project in the industry
33.	Apply inventory control techniques to reduce production cost
34.	Manage activities related to procurement, stacking, storage and preservation of materials.

5. ABSTRACT OF CURRICULUM AREAS

a) PROGRAM CORE COURSES

Textile Fibre
Spinning Technology-I
Weaving Technology-I
Textile Fibre (Lab)
Spinning Technology-I (Lab)
Weaving Technology-I (Lab)
Advance Skill Development (Open Elective-1*)
Summer Internship (4 Week)
Textile Testing
Spinning Technology-II
Weaving Technology-II
Fabric Structure and Design
Spinning Technology-II (Lab)
Weaving Technology-II (Lab)
Advance Skill Development (Open Elective-2*)
Advance Spinning Technology
Advance Weaving Technology
Non-Woven Technology
Summer Internship (6 Week)
Technical Textile
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

Essence of Indian Knowledge and Tradition

6. STUDY AND EVALUATION SCHEME FOR DIPLOMA PROGRAMME IN TEXTILE TECHNOLOGY (351)

THIRD SEMESTER

Sr. No.	SUBJECTS	COURSE TYPE & CATEGORY	STUDY SCHEME			Credits	MARKS IN EVALUATION SCHEME										Total Marks of Internal & External
			Periods/Week	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	SPINNING TECHNOLOGY - I	PROGRAM CORE (THEORY)	04	-	-	4	40	-	40	60	3	-	-	60	100		
3.3	WEAVING 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	-	40	100		
3.5	SPINNING TECHNOLOGY - I (LAB)	PROGRAM CORE (PRACTICAL)	-	-	04	2	-	60	60	-	-	40	-	40	100		
3.6	WEAVING TECHNOLOGY – I (LAB)	PROGRAM CORE (PRACTICAL)	-	-	04	2	-	60	60	-	-	40	-	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.

STUDY AND EVALUATION SCHEME FOR DIPLOMA PROGRAMME IN TEXTILE TECHNOLOGY (351)

FOURTH SEMESTER

Sr. No.	SUBJECTS	COURSE TYPE & CATEGORY	STUDY SCHEME			Credits	MARKS IN EVALUATION SCHEME										Total Marks of Internal & External
			Periods/Week				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	SPINNING TECHNOLOGY – II	PROGRAM CORE (THEORY)	03	-		3	40	-	40	60	3	-	-	60	100		
4.3	WEAVING 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	SPINNING TECHNOLOGY – II (LAB)	PROGRAM CORE (PRACTICAL)	-	-	04	2	-	60	60	-	-	40	-	40	100		
4.7	WEAVING TECHNOLOGY – II (LAB)	PROGRAM CORE (PRACTICAL)	-	-	04	2	-	60	60	-	-	40	-	40	100		
4.8	ADVANCE SKILL DEVELOPMENT	(Q)OPEN ELECTIVE-2 (THEORY)	02	-	-	2	50	-	-	-	-	-	-	-	N/A		
		(Q)OPEN ELECTIVE-2 (Certification Course)					-	-	-	-	-	-	-	-	N/A		
4.9	(Q)ESSENCE OF INDIAN KNOWLEDGE AND TRADITION	AUDIT COURSE	02	-	-	-	50	-	50	-	-	-	-	-	N/A		
#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

PROGRAMME ELECTIVE-1

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

7. DETAILED CONTENTS OF VARIOUS SUBJECTS

THEORY	3.1 TEXTILE FIBRE	L	T	P
		3	-	-

COURSE OBJECTIVE

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.

COURSE OUTCOMES (CO):

The theory should be taught in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

CO1 • Students will be able to classify textile fibres and explain their properties and fibre-forming polymer characteristics.

CO2 • Students will be able to explain the cultivation, structure, properties, and applications of cotton, jute, and other natural bast fibres.

CO3 • Students will be able to describe the types, structure, composition, properties, and applications of wool and silk fibres.

CO4 • Students will be able to explain fibre formation methods and describe the manufacture, properties, and applications of polyester and polyamide fibres.

CO5 • Students will be able to explain the manufacturing processes of acrylic and regenerated fibres and describe their properties and applications.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	-	-	-	-	-	-	*	*
CO2	3	3	-	-	-	-	-	*	*
CO3	3	2	-	-	-	-	-	*	*
CO4	3	3	3	-	-	-	-	*	*
CO5	3	1	-	-	-	-	-	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

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 and Jute Fiber : (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 and 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 and 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-V: Acrylic Fibre and Regenerated Fibre (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 ongoing 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. वस्त्ररेशे-उत्पादन विशेषताएँ एवं उपयोग-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 text book 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 SPINNING TECHNOLOGY - I	L	T	P
		4	-	-

COURSE OBJECTIVE

In the manufacture of textiles spinning is an inevitable process. It involves a variety of activities before a fibre can be converted into yarn. This paper deals with pre-spinning activities. The subject has been divided in three papers other two are Spinning Technology-I and Spinning Technology-II in the further semester of the course. They deal with various spinning processes and other relevant information.

COURSE OUTCOMES (CO):

The theory should be taught in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

CO1 • Students will be able to explain the sequence and objectives of processes involved in converting fibres into yarn.

CO2 • Students will be able to explain ginning and baling processes, classify and describe ginning machines, identify ginning defects, and understand advancements in ginning and baling.

CO3 • Students will be able to explain the objectives, working, and components of the blow room, including mixing, opening, cleaning, lap forming, and modern machinery, and calculate efficiency, production, and waste standards.

CO4 • Students will be able to explain the objectives, parts, working, and advancements of carding machines, including card clothing, grinding, stripping, and calculate speeds, drafts, production, efficiency, and waste.

CO5 • Students will be able to explain the working, components, types, and technological advancements of draw frames, analyze drafting processes and systems, monitor quality, identify defects, and calculate draft and production.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	2	-	2	-	-	2	*	*
CO2	3	3	-	2	2	-	2	*	*
CO3	3	3	-	3	2	-	2	*	*
CO4	3	3	-	3	2	-	2	*	*
CO5	3	3	-	3	2	-	2	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

COURSE CONTENTS

Unit –I Introduction

(02 Periods)

Introduction to various processes involve in conversion of fiber into yarn with objective.

Unit –II Ginning and Baling

(04 Periods)

Ginning, objects of Ginning, classification of Ginning machines, description and working of knife roller Gins e.g. Single roller gin, Double roller gin, Description and working of Macarthy Gins e.g. Single macarthy gin, Double Macarthygin, Description and working of saw gins e.g. Single saw gin, Double saw gin and Improved saw gin, Defects in ginning and their removal, Pressing and baling and its importance, Typical Bale Sizes & weight for different types of fibres across countries, advancement in Ginning & in Baling

Unit-III Blow Room

(20 Periods)

Mixing and its importance, method of mixing, Mixing Layout. Advantages and disadvantages. Description and working of auto mixer and other modern blenders, Role of mixing oil, anti-static agents, Anti fly agents in mixing, Blow room – raw material properties, Blow Room: Objects of Blow room. Importance of opening and cleaning, Study of opening and cleaning machines e.g. Whitin axi flow machine, Air stream cleaner, Three bladed beater and Kirschner beater. E. R. M. cleaner Metal separators, and Mono cylinder beaters, Chute feed System, Piano feed regulation motion and calculating the blow room cleaning efficiency, Study of Modern Blow room- Bale-Plucker (Blend Mat, Uni Flock), Coarse Cleaner (Uni Clean, CLP, Vario Clean), Multimixer (Uni mix, Truschlermul timixer), Fine Cleaner (Supremo Clean, CLC-III), Contamination Clearer (Magic EYE, Securo Mat) Object of Lap forming mechanism, Study of Scutcher Machine and mechanism of Calendar Rollers, Gearing Diagram of Blow Room Machine, Calculation of production of sketchers and other machines and efficiency, calculation of lap length and measuring motions, types of Blow Room Waste, its calculation & its Industry Standard for different fibres, advancement in Blow Room

Unit-IV Carding

(20 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 frontplate, Cylinder, Flats, Doffer Under casing etc, Theory of Carding actions in are volving flat card, Drives of Card parts, Flexi bleand metallic card clothing, Types of clothing wires and it geometry, method of mounting the card with flexible and metallic card clothing, Objective of Card grinding, Grindingins truments, Card grinding routine, Flat grinding, Integrated grinding system, Card stripping, its objects, effects of stripping equipment e.g. Plain stripping roll and vacuum stripper, development in Carding, Special features of high product ion carding machines, Tandem cards with chute feed system, Calculation of speeds, drafts and productions of card, Calculation of production, efficiency, draft and waste percentage, Advancement in Carding.

Unit-V Draw Frame

(10 Periods)

Introduction to Draw Frame, Definition and Purpose, Importance in Spinning, Creel Section, Drafting System, Delivery System, Drafting Process, Drafting Zones, Drafting Waves, Process Parameters and Control, Drafting Settings, Study of different drafting systems e.g. 3/3, 3/4, 3/5, 4/4 and 4/5 drafting systems, Auto-Leveling Systems, Quality Monitoring, Types of Draw Frames, Breaker Draw Frame: Function and importance in the initial stages of sliver preparation, Finisher Draw Frame: Role in refining sliver quality and preparing for subsequent spinning processes, Operational Aspects, Creeling and Doffing: Procedures for loading and unloading sliver cans, ensuring continuous operation, Maintenance Practices: Routine checks and upkeep to ensure optimal performance and longevity of the draw frame, Recent Developments and Innovations

Technological Advancements, Exploring the integration of automation, digital controls, and advanced

sensors in modern draw frames, Performance Enhancements: Improvements in delivery speeds, energy efficiency, and adaptability to different fiber types, Applications and Implications, Impact on Yarn Quality: Correlating draw frame operations with yarn properties such as strength, evenness, and appearance, Economic Considerations: Analyzing the cost-effectiveness of draw frame operations in large-scale textile production, 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.

NOTE: Question paper must contain at least 25% numerical problem.

INSTRUCTIONAL STRATEGY

Teachers should take theory lecture, demonstrate 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. Technology of Short Staple Spinning by W.Klein
2. Principle of Spinning by A.R. Khare

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Periods)	Marks Allotted (%)
1	02	5
2	04	10
3	20	35
4	20	35
5	10	15
Total	56	100

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

COURSE OUTCOME

Weaving is interlacing of yarn into fabric. It is a vital process in the textile industry. The subject has been divided into three papers the other two are Weaving Technology-I and Weaving Technology-II of the course deal with various activities involved in process. This paper deals with preparatory activities and motions of plain looms involved in the weaving process.

COURSE OUTCOMES (CO):

The theory should be taught in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

CO1 • Students will be able to explain types of winding, mechanisms, high-speed winding machines, common faults and remedies, and methods to measure and control quality, productivity, and waste in winding.

CO2 • Students will be able to explain types of warping, warping machines, creels, stop and measuring motions, common faults and remedies, and methods to control quality, productivity, and waste in warping.

CO3 • Students will be able to explain the objectives, methods, machines, ingredients, and processes of warp sizing, drawing-in, knotting, and twisting, along with measuring and controlling quality, productivity, and faults.

CO4 • Students will be able to describe the history, terminology, and motions of handlooms and plain tappet power looms.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PSO2
CO1	3	2	-	-	2	-	2	*	*
CO2	3	2	-	-	2	-	2	*	*
CO3	3	3	-	-	2	-	2	*	*
CO4	3	2	-	-	2	-	2	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

COURSE CONTENTS

UNIT-I Winding:

(10 Periods)

1. Types of packages, Introduction to drum and precision winding.
2. Traversing mechanisms (Rotary, Reciprocating)
3. High speed and super high-speed warp wind in g machines- Schlafhorst Autoconer, Savio, Murata winding machine.
4. Study of various types of slub catchers, traversing devices, tensioning devices, ribbon formation and methods of eliminating them. Full package stop motions. Different types of high-speed pin winding machines.
5. Commonly occurring faults in warp winding, their causes and remedies.
6. Bunch building mechanisms.
7. Commonly occurring faults in pin winding, their causes and remedies occur.
8. Measurement and control of quality and productivity and waste in winding.

UNIT-II Warping:

(10 Periods)

1. Introduction to various ways of warping.
2. Types of creels and their description.
3. Description of Direct & Sectional warping machine and thier passage of material.
4. Stop motions. Measuring motions and tensioning devices.
5. Commonly faults occur in warping and their causes and remedies.
6. Measurement and control of quality and productivity and waste in warping.

UNIT-III Sizing:

(14 Periods)

1. Object of warp sizing.
2. Introduction to various methods of sizing.
3. Description of sizing machine and their passage of material.
4. Detailed study of slashersizing machine, measuring and marking motion, beam creels, brake guide and tension rollers, sizing and squeezing rollers, drying cylinders, steam trap, sow box construction, Features of modern sow box
5. Multi cylinders and drying system machines with special reference to drying unit, Introduction to foam, hot melt and cold sizing.
6. Various kinds of sizing ingredients are used for cotton, polyester, viscose and their blends.
7. Preparation of size paste for light medium and heavy size for cotton and man-made fibers blend.
8. Measurement and control of quality and productivity and waste in sizing.
9. Manual and mechanical methods of drawing-in, knotting, twisting of warp.
10. Measurement and control of quality and productivity in drawing-in.
11. Commonly occurring faults in sizing, drawing, denting and knotting.

UNIT-IV Plain Loom

(08 Periods)

1. History of weaving and Introduction of Handloom
2. Terminology.
3. Power loom-primary, Secondary and auxiliary motions of plain tappet loom.

INSTRUCTIONAL STRATEGY

Teacher should take theory lecture, demonstrate concepts and proto type

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. 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

Websites for Reference:

<https://nptel.ac.in/courses/116102005>

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	10	24
2	10	24
3	14	34
4	8	18
Total	42	100

PRACTICAL	3.4 TEXTILE FIBRE	L	T	P
		-	-	4

COURSE OBJECTIVES

The course provides students with practical skills in testing and identifying textile fibres. Students will learn to determine moisture regain, examine fibres microscopically, and identify natural, regenerated, and synthetic fibres using physical and chemical tests. They will also perform quantitative estimation of fibre blends and interpret fibre characteristics for assessing quality and supporting textile processing applications.

COURSE OUTCOMES (CO):

The practical should be carried out in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

Students will be able to

CO1 • Students will be able to determine the moisture regain of various natural and synthetic fibres using standard conditioning methods.

CO2 • Students will be able to identify cotton and jute fibres through microscopic examination, drawing their longitudinal and cross-sectional views.

CO3 • Students will be able to identify wool and silk fibres using microscopic, chemical, and physical tests and interpret their structural characteristics.

CO4 • Students will be able to identify polyester, polyamide, acrylic, and viscose fibres using microscopic, chemical, and physical tests and understand their distinguishing features.

CO5 • Students will be able to perform quantitative estimation of fibre blends and analyze fibre composition for quality assessment and practical textile applications.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	2	-	3	1	-	2	*	*
CO2	3	2	-	3	1	-	2	*	*
CO3	3	2	-	3	1	-	2	*	*
CO4	3	2	-	3	1	-	2	*	*
CO5	3	2	-	3	1	-	2	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

LIST OF PRACTICALS

1. Checking moisture regains different natural textile fibres using a reputable brand-conditioning oven.
2. Checking moisture regains different synthetic textile fibres using a reputable brand conditioning oven.
3. Identifying cotton fibers under a microscope and drawing their longitudinal and cross- sectional views.
4. Identifying cotton fibers by chemical and physical test.
5. Identifying jute fibers under a microscope and drawing their longitudinal and cross- sectional views.
6. Identifying jute fibers by chemical and physical test.
7. Identifying wool fibers under a microscope and drawing their longitudinal and cross- sectional views.
8. Identifying wool fibers by chemical, physical test.
9. Identifying silk fibers under a microscope and drawing their longitudinal and cross- sectional views.
10. Identifying silk fibers by chemical and physical test.
11. Identifying polyester fibers under a microscope and drawing their longitudinal and cross- sectional views.
12. Identifying polyester fibers by chemical, Physical test.
13. Identifying polyamide fibres under a microscope and drawing their longitudinal and cross- sectional views.
14. Identifying polyamide fibres by chemical and 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 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 SPINNING TECHNOLOGY – I	L	T	P
		-	-	4

COURSE OBJECTIVES

The course aims to provide students with hands-on skills in operating, setting, and maintaining key preparatory machines in spinning, including bale openers, porcupine openers, beaters, and carding machines. Students will learn to measure and gauge machine components, calculate the speeds of moving parts, determine drafts, and understand production parameters such as laps consumed per shift. This practical training enables students to develop proficiency in machine operations, process calculations, and quality control in fibre preparation for spinning.

COURSE OUTCOMES (CO):

The practical should be carried out in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

Students will be able to

CO1 • Students will be able to operate and set up blending bale openers and porcupine openers, including measuring and gauging key machine components.

CO2 • Students will be able to calculate the speeds of different moving parts in bale openers, openers, beaters, and other preparatory machines.

CO3 • Students will be able to operate and maintain Kirschner beaters and carding machines, including performing piecing of laps and slivers..

CO4 • Students will be able to grind and maintain carding machine parts, including cylinder, doffer, and flat tops, and set and gauge the machine components accurately.

CO5 • Students will be able to calculate drafts, draft constants, and production parameters such as laps consumed per shift, ensuring process efficiency and quality control in spinning preparation.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	2	-	3	1	-	2	*	*
CO2	3	2	-	3	1	-	2	*	*
CO3	3	2	-	3	1	-	2	*	*
CO4	3	2	-	3	1	-	2	*	*
CO5	3	2	-	3	1	-	2	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

LIST OF PRACTICALS

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 porcupine opener, step cleaner and other opening machines available in the work shop and also calculate speeds of different moving parts.
4. Operation, setting and maintenance of Kirschner beater and to calculate number of beats per inch of feed material.
5. Operate the card machine and produce sliver and to practice piecing lap and sliver.
6. Grinding of Cylinder and Doffer Wire.
7. Grinding of Flat Tops.
8. To set and gauge different part of card machine..
9. Calculate the speeds of cylinder, flats, doffer and lick-in and other moving parts of card machine.
10. To calculate all tension drafts, all intermediate drafts, total drafts and draft constants of a card machine.
11. To calculate number of laps consumed per shift of eight hours.

PRACTICAL	3.6 WEAVING TECHNOLOGY – I	L	T	P
		-	-	4

COURSE OBJECTIVES

The course aims to provide students with hands-on experience in warp preparation, sizing, and weaving operations. Students will learn to prepare cones, cheeses, and pins, operate sectional and high-speed warping machines, prepare size paste, and practice sizing processes. They will also develop skills in making weaver's knots, drafting, denting, and beam gaiting. Additionally, students will study, sketch, and understand the important parts and operations of winding machines, weaving machines, shuttles, and handlooms, enabling them to connect theoretical knowledge with practical textile processes.

COURSE OUTCOMES (CO):

The practical should be carried out in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

Students will be able to

CO1 • Students will be able to practice preparing cones, cheeses, and pins from hanks or ring bobbins and understand their importance in warp preparation.

CO2 • Students will be able to operate sectional and high-speed warping machines, including creeling, beam preparation, and warp planning for required ends and widths.

CO3 • Students will be able to prepare size paste and operate sizing machines, performing sizing processes effectively in the laboratory.

CO4 • Students will be able to practice drafting, denting, beam gaiting, and making weaver's knots to prepare warps for weaving operations.

CO5 • Students will be able to study, sketch, and understand the important parts and operations of winding machines, weaving machines, shuttles, and handlooms, linking practical knowledge with textile theory.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	2	2	3	1	-	2	*	*
CO2	3	2	2	3	1	-	2	*	*
CO3	3	2	2	3	1	-	2	*	*
CO4	3	2	-	3	1	-	2	*	*
CO5	3	2	3	3	1	-	2	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

LIST OF PRACTICALS

1. Practice preparing cones, cheeses and pins from hanks or ring bobbins.
2. Practice in creeling and preparation of warp on sectional warping machine of required number of ends and width.
3. Practice in creeling and preparation of warpers beam on High-Speed warping machine of required warp plan.
4. Practice in operating sizing machines (if working model of sizing plant available).
5. Practice of size paste preparation in the laboratory.
6. Practice of making weaver's knot in the laboratory.
7. Practice in drafting and denting for different design drafts.
8. Study and sketch the important parts of pin winding machine.
9. Study and sketch the important parts of the warp winding machine.
10. Study and sketch different types of Shuttles.
11. Practice of beam gaiting.
12. Prepare Sketch and study of cross-Sectional View of Weaving Machine.
13. Sketching of Handloom and its operation.

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

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

CO1: Explain the basic features of the Indian economy, including demographic trends, and analyze major economic problems like poverty, unemployment, and inflation.

CO2: Discuss the role of the agricultural sector, the impact of land reforms and the Green Revolution, and evaluate current agricultural policies.

CO3: Describe the industrial development pattern, the significance of small-scale industries, and the growth of the service sector in India.

CO4: Analyze the framework of economic planning (Planning Commission vs. NITI Aayog), and the impact of Monetary, Fiscal, and LPG policies.

CO5: Interpret India's external sector performance, including foreign trade composition, Balance of Payments, and the impact of Globalization and WTO.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Engineering Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PS O1	PSO2
CO1	1	2	-	-	2	1	2	*	*
CO2	1	2	-	-	2	1	1	*	*
CO3	1	1	-	-	2	2	2	*	*
CO4	1	2	-	-	3	3	2	*	*
CO5	1	2	-	-	2	2	2	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

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 OBJECTIVES:

The aim of this course is to help the students to develop the idea of project plan, from defining and confirming the project goals and objectives, identifying tasks and how goals will be achieved.

COURSE OUTCOMES:

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

CO1: Explain the fundamental concepts of project management, including the project life cycle and priorities, and construct a Work Breakdown Structure (WBS) for a given project.

CO2: Apply the capital budgeting process to generate and screen project ideas and analyze market feasibility using demand forecasting techniques.

CO3: Estimate project costs, working capital requirements, and prepare projected financial statements including Cash Flow and Break-Even analysis.

CO4: Evaluate the financial viability of projects using discounting (NPV, IRR) and non-discounting (Payback, ARR) capital budgeting techniques and social cost-benefit analysis.

CO5: Develop project schedules using Network Planning techniques (CPM/PERT) to analyze time-cost trade-offs and determine the least cost duration.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Engineering Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PSO2
CO1	2	1	1	-	-	3	1	*	*
CO2	2	2	-	-	1	3	2	*	*
CO3	2	2	-	-	-	3	1	*	*
CO4	2	2	-	-	2	3	2	*	*
CO5	2	3	1	2	-	3	1	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

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-Pearson Publication

SUGGESTED DISTRIBUTION OF MARKS

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

PRACTICUM	4.1 TEXTILE TESTING	L	T	P
		2	-	2

COURSE OBJECTIVE

The Textile Testing Practicum aims to provide students with practical knowledge and hands-on skills in testing fibres, yarns, fabrics, and finished textiles. It covers the principles and methods of fibre, yarn, fabric, and chemical testing, including measurement of fibre length, fineness, strength, yarn count, twist, fabric strength, tear and bursting properties, abrasion, air permeability, crease recovery, pilling, and colour fastness. Students also learn sampling techniques, quality control, statistical analysis, and the use of standard testing instruments, enabling them to assess textile performance, ensure quality, and apply testing knowledge in industrial and research contexts.

COURSE OUTCOMES (CO):

The theory and experiment should be taught in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

CO1 • Apply textile testing, quality control, and statistical tools to evaluate yarn properties.

CO2• Apply standard instruments and methods to measure fibre length, fineness, maturity, strength, and moisture characteristics under controlled humidity conditions.

CO3• Apply yarn count, twist, strength, diameter, and evenness testing methods to analyze yarn quality and irregularities using standard instruments.

CO4 • Apply standard fabric testing methods to evaluate strength, tear, bursting, abrasion, crimp, air permeability, crease recovery, and pilling properties of textiles.

CO5 • Analyze fibre blend composition and evaluate colour fastness, absorbency, and finishing quality of textiles using standard testing methods.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	2	3	2	-	-	2	*	*
CO2	3	-	-	3	2	-	2	*	*
CO3	3	2	-	3	-	2	2	*	*
CO4	3	2	2	3	-	-	2	*	*
CO5	3	2	-	3	2	2	2	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

COURSE CONTENTS

UNIT-I 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-II Fibre Testing:

(06 Periods)

Fibre Length (mean length, effective length and staple length. .Fiber Length Measurement - Use of Baer sorter, Fibro graph, Uster-stapler, their principles of operation., Fibre Fineness Measurement- By cutting and weighing method, Sheffield micronaire, Aerlometer, Maturity of cotton by caustic soda method and by airflow methods.,

Role of Humidity-Absolute Humidity, Relative Humidity, 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 fibro graph.
3. Measure fibre fineness by flowing air through has ample fibre by micronaire.
4. Fiber Strength Testing by Stelometer

UNIT-III 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 class faults

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-IV 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-V 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 proto type

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 BP Saville

WEBSITES FOR REFERENCE:

<https://nptel.ac.in/>

SUGGESTED DISTRIBUTION OF MARKS

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

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

COURSE OBJECTIVE

The course on Spinning Technology-II aims to provide students with practical and theoretical knowledge of spinning processes, including combing, roving, ring spinning, doubling, and reeling. It covers the construction, operation, and functions of key spinning machinery, drafting and twisting mechanisms, production calculations, efficiency, and quality control of yarns. Students will gain the ability to analyze and optimize spinning processes, understand yarn properties and faults, and apply modern spinning technologies and developments for efficient and high-quality yarn production in the textile industry.

COURSE OUTCOMES (CO):

The theory should be taught in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

CO1 • Understand the principles, construction, and operation of combing machines and lap preparation methods, including modern techniques and combing efficiency.

CO2 • Explain the construction, functions, and working of roving frames, drafting and twisting mechanisms, and calculate roving production, draft, and twist.

CO3 • Analyze the ring spinning process, including ring frame components, twisting mechanisms, drafting systems, yarn faults, and efficiency calculations.

CO4 • Understand the principles and operations of yarn doubling, including ring doubling, two-for-one twist, and production of fancy and folded yarns.

CO5 • Understand the reeling and bundling processes, types of reels, and methods of yarn collection and storage for efficient handling and subsequent processing.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	2	2	2	2	-	2	*	*
CO2	3	3	2	2	2	-	2	*	*
CO3	3	3	3	3	2	-	2	*	*
CO4	3	2	2	2	2	-	2	*	*
CO5	3	2	2	2	2	-	2	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

COURSE CONTENTS

Unit –I Combing-

(08 periods)

Importance and use of combing, Sliver lapper - Its object, construction and methods of feeding slivers to the sliver lapper, Draft and production, lap winding and roll setting of sliver lapper, Ribon lapper - Its importance and construction, draft and production of ribbon lapper. Stop motion of ribbon lapper, Construction and working of super lapper and lap former Machine, Drawing lap formation combination its advantages. Study of automatic lap former, Modern methods of lap preparation-Super Lap, Omega Lap, historical development, Comber, combing cycle, detailed study of Nasmith comber, Modern trends in combing and control of comber waste, Comber oil study of modern comber and study of various parts and their functions, settings, speeds and mechanism. Production and efficiency of comber, Degree of Combing, Calculation of N oil% , Draft and production of comber,

Unit-II Roving:

(10 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 mechanism, study of motions required for twisting flyer and its functions,

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, study of differential motion, Electronic Differential and Building Motion, Roving Breakages and Its Control, Recent Development in Roving Frame, Calculation pertaining to production, twist, draft and winding.

Unit-III Ring Spinning:

(17 Periods)

Objects of ring frames, 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 e.g. Spring and, Pneumatic drafting and their advantages, break draft and its effect, Building motion, its objects construction and working, Types of builds (i) Warp (ii) Filling (iii) Combination, Drive of ring frame, Different systems of Ring Frame drive like Group drive, Single Motor Drive, VPS (Variable Pitch Seath) and Dual Drive, Inverter drive, Causes of end breaks in ring frame,

Limitation of Large Package Spinning, System of waste collection at ring frames and different types of spinning wastes, Factor's responsible for less efficiency in spinning. (xii) Limitations of ring spinning Yarn faults and their remedies, Principle & Working of compact spinning, Recent developments in Ring Spinning.

Ring Frame Calculation:

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 Traveler speed, traveler lag calculation.

Unit-IV Doubling

(05 Periods)

Object of ring doubling, doubling and its effects, dry and wet system of doubling. Detailed study of Ring Doubler and 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, Production of folded yarn, cord and tape yarn, Calculation of folded yarns.

Unit-V Reeling bundling**(02 Periods)**

Object and terminology, Types of Reels, Construction and working of Reels, Different system of Reeling. Yarn bundling and bailings.

NOTE: Question paper must contain at least 30% numerical problems.

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. 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 Winter bottom

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	08	20
2	10	25
3	17	40
4	05	10
5	02	5
Total	42	100

THEORY	4.3 WEAVING TECHNOLOGY - II	L	T	P
		3	-	-

COURSE OBJECTIVE

The course on Weaving Technology-II aims to provide students with a comprehensive understanding of advanced weaving mechanisms and machine operations. It covers shedding, picking, beating-up, take-up and let-off motions, warp and weft stop motions, and warp protection systems. Students will learn the principles, construction, and working of dobbies, jacquard machines, and multiple box motions, including electronic and automatic weaving systems. The course also emphasizes fault diagnosis, remedies, pattern preparation, and calculation of fabric parameters, enabling students to analyze, operate, and optimize weaving processes for efficient and high-quality fabric production.

COURSE OUTCOMES (CO):

The theory should be taught in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

CO1 • Understand the principles, construction, and working of shedding, picking, and beating-up mechanisms in weaving machines.

CO2 • Explain the functions and operations of take-up motions, let-off motions, weft stop motions, and warp protection systems.

CO3 • Analyze the construction and operation of dobby machines, including electronic dobbies, and identify common faults and remedies.

CO4 • Understand jacquard weaving, including types of jacquard machines, card preparation, lacing, and electronically controlled jacquards.

CO5 • Describe multiple box motions, automatic weaving systems, shuttle mechanisms, and calculate fabric parameters such as warp and weft density and weight.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	2	2	2	2	-	2	*	*
CO2	3	3	2	2	2	-	2	*	*
CO3	3	3	2	2	2	-	2	*	*
CO4	3	2	2	2	2	-	2	*	*
CO5	3	2	2	2	2	-	2	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

COURSE CONTENTS

UNIT-I.Shedding, Picking and Beating up

(08 Periods)

1. Different types of healds, reeds and shuttles., Different types of sheds, their merits and demerits., Tappet shedding mechanism and warp easing mechanism., Introduction to various types of tappets., Merits and demerits of tappet shedding, Heald reversing motions, Timing of shedding motions. Early and late shedding., Commonly occurring faults in shedding mechanism their remedies. Mechanism of over pick and under pick motions their merits and demerits, early and late picking.
2. Beating up motion: Mechanism of beating motion. Eccentricity of sley.

UNIT-II. Take-Up motions, Let off Motions, Weft stop Motions & Warp Protectors

(08 Periods)

1. Various types of take up motions, Study of five- and seven-wheel intermittent positive take up motion, Continuous positive take up motion, Negative take up motion.,
2. Let off motions, Various types of wefts stop motions., Study of side weft fork motions, Study of center weft fork motion
3. Study of loose reed motion and fast reed motion, Temples, Shuttles guards.

UNIT-III. Dobbies:

(08 Periods)

Classification of dobbies. Study of single lift dobby Keighley and Climax dobbies., Positive dobbies (any two dobbies), Method of preparing dobby lattice and Pattern cards, working Principle of Stable Electronics Dobby, Commonly occurring faults and their remedies.

UNIT-IV. Jacquard:

(08 Periods)

1. Introduction to figure weaving., Kinds of jacquard., Single lift single cylinder jacquard, Double lift single cylinder jacquard., Double lift double cylinder jacquard., Cross border jacquard, Harness ties.
2. Card cutting, Piano card cutting machine and lacing of cards, Repairing, adjustments and timing of the above machines.
3. Functional principle of electronically controlled Double lift Jacquard Machine. Commonly occurring faults in jacquard weaving and their remedies.

UNIT-V. Multiple box Motions &Automatic Weaving:

(10 Periods)

1. Introduction and classification multiple box motions, Study of Cow burn and Peck's box motions card saving device, safely devices, Study of pick at will box arrangement, Study of non-skip and skip motions.
2. Preparation of chain for given pattern of weft. Commonly occurring faults in boxes of the above mechanisms and their remedies.
3. Feeler, cutter and three pick try motion. Warp stop motion. Weft Fork motion.
4. Pirnc hanging mechanism, Shuttle protector Shuttle changing
5. Calculation of warp, weigh to weft, wt/sq. yard etc.

INSTRUCTIONAL STRATEGY

Teacher should take the oral lecture, demonstration of concept 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. Weaving: Machine, mechanism and Management by M.K. Talukdar
2. Principle Of Weaving by Mark & Robinson
3. Weaving Technology-II by NCUTE

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Periods)	Marks allotted (%)
1	8	20
2	8	20
3	8	20
4	8	20
5.	10	20
Total	42	100

PRACTICUM	4.4 FABRIC STRUCTURE & DESIGN	L	T	P
		02	-	02

COURSE OBJECTIVE

The course on Fabric Structure and Design aims to provide students with a thorough understanding of fabric construction principles and design concepts for woven fabrics. It covers plain, twill, satin, sateen, piques, welts, backed fabrics, extra warp and weft, and double cloth structures. Students will learn to analyze fabric samples, prepare drafts, lifting plans, and peg plans, and construct fabrics on desk looms. The course emphasizes practical skills in designing, planning, and producing woven fabrics while developing the ability to interpret, create, and innovate fabric structures for functional and aesthetic applications.

COURSE OUTCOMES (CO):

The theory and experiment should be taught in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

CO1 • Understand the basic principles of fabric structures, including woven, knitted, non-woven, and bonded fabrics, and their functional and aesthetic applications.

CO2 • Analyze and construct plain weaves and their derivatives, including matt, hopsack, and ribbed structures, using design, draft, and peg plans.

CO3 • Understand and construct twill, satin, and sateen weaves, including their regular, irregular, and fancy derivatives, and evaluate their characteristics and uses.

CO4 • Understand the construction, varieties, and characteristics of piques, welts, and Bedford cords, including methods of embellishment and design interpretation..

CO5 • Understand backed fabrics and the use of extra warp and extra weft techniques, including drafting, beaming, and disposal of extra threads for creating spot figures.

CO6 • Analyze and construct double and multiple cloths, including tubular fabrics, double-faced fabrics, and center-stitched double cloth, and apply drafting and pegging techniques for complex fabric designs.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	2	3	-	2	-	2	*	*
CO2	3	2	3	-	2	-	2	*	*
CO3	3	3	3	-	2	-	2	*	*
CO4	3	2	3	-	2	-	2	*	*
CO5	3	2	3	-	2	-	2	*	*
CO6	3	2	3	-	2	-	2	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

COURSE CONTENTS

UNIT-I. Introduction and Plain Weave

(05 Periods)

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

- i. Definition of Warp and Weft, Ends and Picks. Determination of warp and weft 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 derivatives in the form of simple Matt or Hopsack and Ribbed Structures.

PRACTICAL

1. Manufacturing Plain weaves and their derivatives in Desk Loom.

UNIT-II. 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 Twill weave and their derivatives on Desk Loom.

Unit-III. 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-IV. Welts and Piques, Bedford 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-V. 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-VI. 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

Teachers should take theory lecture, demonstrate 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	4.5.1 TEXTILE CHEMICAL PROCESSING	L	T	P
		2	-	-

COURSE OBJECTIVE

The course on Textile Chemical Processing aims to provide students with fundamental knowledge of chemical treatments applied to textile materials during preparation, dyeing, printing, and finishing processes. It covers the removal of impurities from natural fibres, preparatory treatments such as desizing, scouring, bleaching, mercerization, and fibre-specific processes like carbonization and degumming. Students will gain an understanding of dye classification and dyeing methods for different fibres, printing techniques and styles, and the objectives and effects of various textile finishing processes. The course enables students to understand process selection, fibre behavior, and quality improvement in textile wet processing for industrial applications.

COURSE OUTCOMES (CO):

The theory should be taught in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

CO1 • Understand the impurities present in natural fibres and the principles of preparatory processes such as desizing, scouring, bleaching, carbonization, and degumming.

CO2 • Explain the objectives, process methods, and effects of mercerization on yarns and fabrics

CO3 • Classify dyes based on their application and understand dyeing processes for cotton, wool, silk, polyester, and acrylic fibres.

CO4 • Understand the principles, methods, and styles of textile printing, including block, screen, spray, direct, resist, and discharge printing.

CO5 • Understand the objectives and effects of various textile finishing processes such as crease-resistant, water-repellent, antimicrobial, and soil-repellent finishes.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	2	-	-	2	-	2	*	*
CO2	3	2	-	-	2	-	2	*	*
CO3	3	3	-	-	2	-	2	*	*
CO4	3	2	-	-	2	-	2	*	*
CO5	3	2	-	-	2	-	2	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

COURSE CONTENTS

Unit – I: Preparatory Process

(08 Periods)

General Introduction of the 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 wool and silk with Acid dyes.
4. Dyeing Polyester with disperse dyes.
5. Dyeing 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.

Unit– V: Finishing

(04 Periods)

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

INSTRUCTIONAL STRATEGY

Teachers should take theory lecture, demonstrate concepts and proto type

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 (%)
1	08	25
2	03	10
3	08	30
4	05	20
5	04	15
Total	28	100

THEORY	4.5.2 PRINCIPLE OF DESIGN AND COLOR	L	T	P
		2	-	-

COURSE OBJECTIVE

The course on Principle of Design and Color aims to develop students' understanding of drawing, sketching, colour theories, and their application in textile design. It covers basic and advanced sketching techniques, light and pigment theories of colour, colour harmony, contrast, and colour modification. Students will learn to apply colour and weave effects in simple and compound weaves and develop textile patterns using different repeat systems. The course enables students to create balanced, harmonious, and aesthetically effective textile designs by integrating principles of design, colour, and fabric structure.

COURSE OUTCOMES (CO):

The theory should be taught in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following COURSE OUTCOMES.

Students will be able to

CO1 • Develop skills in drawing, tracing, sketching, and preparing basic and elaborate motifs suitable for textile designs.

CO2 • Understand the fundamentals of light theory of colours, including spectrum, primary, secondary, and complementary colours.

CO3 • Understand pigment theory of colours, colour modification, contrast, harmony, tints, shades, and broken hues.

CO4 • Apply colour effects to simple and compound weaves to achieve desired aesthetic and structural effects in fabrics..

CO5 • Develop textile patterns using different repeat systems and transfer motifs onto graph paper with appropriate weave application.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	2	3	3	2	-	2	*	*
CO2	3	2	3	-	2	-	2	*	*
CO3	3	3	3	-	2	-	2	*	*
CO4	3	2	2	-	2	-	2	*	*
CO5	3	3	2	-	2	-		*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

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 the 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 (%)
1.	06	10
2.	04	20
3.	06	30
4.	06	20
5.	06	20
Total	28	100

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

COURSE OBJECTIVES

The Spinning Technology-II practical course aims to provide students with hands-on training in advanced spinning operations and machinery used in the textile industry. The course emphasizes practical skills in operating, setting, gauging, and maintaining machines such as sliver lap, ribbon lap, comber, draw frame, fly frame, ring frame, ring doubler, winding, reeling, and bundling machines. Students will learn to calculate draft, twist, spindle speed, roller speed, production, and efficiency from machine particulars. The course also develops competence in yarn formation, folded yarn production, waste analysis, breakage study, and preparation of spin plans, enabling students to apply theoretical knowledge effectively for efficient yarn manufacturing and mill operations.

COURSE OUTCOMES (CO):

The practical should be carried out in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

Students will be able to

CO1 • Operate, set, and gauge preparatory spinning machines such as sliver lap, ribbon lap, comber, and draw frame, and calculate draft, speed, production, and efficiency.

CO2 • Perform practical operations on fly frames and drawing machines, including piecing, setting building and traverse motions, roller gauging, lubrication, and maintenance.

CO3 • Operate ring frames to produce yarn and carry out calculations related to draft, twist, spindle speed, TPI, and production, along with machine setting and gauging.

CO4 • Operate winding, reeling, bundling, and doubling machines to produce cheeses, hanks, bundles, and folded yarns, and calculate relevant machine parameters.

CO5 • Analyze spinning performance through waste analysis, breakage study, traveller speed study, doff weight analysis, and preparation of spin plans for efficient mill operation.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysi s	PO3 Design/ Developmen t of Solutions	PO4 Engineer ing Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Manage ment	PO7 Life Long Learning	PSO1	PS O2
CO1	3	2	3	3	1	-	2	*	*
CO2	3	2	2	3	1	-	2	*	*
CO3	3	2	3	3	1	-	2	*	*
CO4	3	3	2	3	1	-	2	*	*
CO5	3	2	2	3	1	-	2	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

LIST OF PRACTICALS

1. Calculate the draft constant, twist constant, spindle speed, front roller speed and production per spindle from machine particulars in the workshop.
2. To prepare sliver laps on the sliver lap machines and to gauge the rollers
3. To calculate all tensions drafts, Intermediate drafts, Total draft, Draft constant and Production of sliver lap machine.
4. Operate the ribbon lap machine and prepare laps and gauge the rollers of the machine.
5. To calculate all tensions drafts, Intermediate drafts, total drafts, Draft constant and Production of ribbon lap machine
6. To operate and set timing of comber and prepare sliver.
7. Set and gauge various parts of comber.
8. To calculate and analyze the comber waste percentage practically and evaluate the combing efficiency.
9. Operate the fly frame with material and practice piecing the roving.
10. Set building motion and traverse motion according to hank of roving.
11. Calculate spindle speed, front roller speed and rate of traverse from machine particulars.
12. To Gauge the drafting rollers and to practice changing draft change pinion (DCP), lifter change, change wheel, twist wheel, ratchet wheel and winding wheel.
13. Operate the drawing machine and practice piecing silver.
14. Setting and gauging of drafting rollers for given staple length of fibres.
15. To lubricate and put the stop motion in proper working order of draw frame.
16. To calculate the speed of different moving parts of draw frame machine
17. To calculate the production on drawing frame per delivery per machine per shift of eight hours
18. To make cheeses on parallel winding machine and calculate drum speed and production.
19. Operate the machine and produce folded yarn and calculate twists constant, TPI, Spindle speed and production.
20. Make hanks of yarn on reeling machine by straight reeling method and cross reeling method
21. Make bundles of yarn on the bundling machine.
22. To Calculation twist constant and draft constant and production from machine particulars of ring frame.
23. Operate the machine and produce yarn.
24. Gauge the Spindle and Lappets.
25. 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.
26. Set the building motion according to the count of yarn.
27. Set the top arm and gauge the top and bottom rollers.
28. Carry out the maintenance of the ring frame practically.
29. To calculate spindle speed, Twist Constant, TPI & Production of ring doubler.
30. To learn about making spin plans, taking breaking study, snap study of idle spindles, labour allocation in Ring frame dept on assumption basis.
31. To study traveler speed & doff weight of Ring frame.
32. To Study Ring Frame Breakages.

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

COURSE OBJECTIVES

The Weaving Technology-II practical course aims to provide students with hands-on experience in advanced weaving mechanisms and their practical applications. The course focuses on the study, sketching, and operation of shedding, picking, and weft control mechanisms, including tappets, cams, reed motions, and weft fork motions. Students will gain practical skills in dobby and jacquard weaving through harness preparation, pattern development, card cutting, lacing, and fault rectification. The course also emphasizes the setting and adjustment of warp and weft stop motions, drop box motions, and let-off systems. Through practical exercises, students develop the ability to analyze weaving faults, prepare weaving plans, and apply technical knowledge for efficient and accurate fabric production in industrial weaving operations.

COURSE OUTCOMES (CO):

The practical should be carried out in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

Students will be able to

CO1 • Prepare sketches and study the mechanisms of shedding, picking, and weft control, including positive and negative tappets, cams, loose and fast reed motions, and weft fork motions.

CO2 • Perform practical operations on dobby and jacquard mechanisms, including harness preparation, pattern development, card cutting, lacing, and fault identification.

CO3 • Set, adjust, and operate warp stop motions, let-off motions, drop box motions, and other weaving accessories to ensure proper fabric formation.

CO4 • Develop and execute weaving plans, including chain preparation for different weft arrangements, and troubleshoot weaving faults effectively.

CO5 • Apply technical knowledge and practical skills to analyze, optimize, and maintain weaving mechanisms for efficient and accurate fabric production.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	3	2	2	3	-	-	2	*	*
CO2	3	3	3	3	-	-	2	*	*
CO3	3	3	3	3	-	-	2	*	*
CO4	3	3	3	3	-	-	2	*	*
CO5	3	3	3	3	-	-	2	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

LIST OF PRACTICALS

1. Prepare Sketch and study of positive and negative Shedding Motion
2. Prepare tappet of Plain, 2/1, 2/2 CAM
3. Prepare Sketch and study of Positive and negative CAM
4. Prepare Sketch and study of Loose Reed and Fast Reed Motion
5. Prepare Sketch and study of side weft fork and centre weft fork motion
6. Study the Electrical Warp Stop Motion.
7. Harness preparation of jacquard.
8. Sketching of cylinder & Knife movement of various types of jacquards.
9. Development of jacquard pattern and their execution after card cutting and card lacing.
10. Settings for feeler, battery, warp stop motion, let off motion and their sketches.
11. Practice preparing dobby lattice.
12. Finding and removing faults in dobby weaving.
13. Fixing and tuning of drop box motion.
14. Chain preparation for different weft plans of Drop Box.
15. Sketching of various parts of drop box motion

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

COURSE OBJECTIVE

The objectives of this course are to:

- Provide a comprehensive understanding of the **current and future global energy scenario**.
- Introduce students to **renewable and non-conventional energy sources** as alternatives to fossil fuels.
- Enable understanding of **solar, wind, and bio-energy systems** and their working principles.
- Develop the ability to **evaluate suitable renewable energy options** for a given location.
- Familiarize students with **economic, environmental, and sustainability aspects** of renewable energy technologies.

COURSE OUTCOMES (CO):

After successful completion of this course, the students will be able to:

CO1: Explain the global energy scenario, energy resources, and the need for renewable energy with economic and environmental perspectives.

CO2: Describe principles, components, and applications of solar energy systems including solar thermal and solar PV technologies.

CO3: Explain wind energy fundamentals, types of wind energy systems, site selection, and performance aspects.

CO4: Evaluate bio-energy generation methods such as biomass combustion, biogas, biofuels, and cogeneration systems.

CO5: Identify and compare alternative renewable energy sources such as tidal, wave, hydro, geothermal, hydrogen, fuel cells, and hybrid systems for suitable applications.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

Course Outcome s (COs)	PO1 Basics & Discipline Knowledge	PO2 Problem Analysis	PO3 Design & Development	PO4 Tools, Experimentation & Testing	PO5 Socio-Economic/ Environmental	PO6 Project Mgmt & Communication	PO7 Lifelong Learning	PSO1	PSO2
CO1	3	1	—	—	2	—	2	*	*
CO2	3	2	2	1	1	1	1	*	*
CO3	2	2	2	—	1	1	1	*	*
CO4	2	2	1	1	2	1	1	*	*
CO5	2	3	1	1	3	1	1	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

COURSE CONTENT

Unit-I:

(5 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-II:

(8 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-III:

(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-IV:

(5 Periods)

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

Unit-V:

(5 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.	05	19
2.	08	24
3.	05	19
4.	05	19
5.	05	19
Total	28	100

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

COURSE OBJECTIVE

The objectives of this course are to:

- Develop competency to **identify and implement energy efficiency measures** in industrial facilities.
- Enable understanding of **energy-efficient equipment and systems** such as pumps, compressors, lighting, and electrical machines.
- Introduce **energy conservation principles, standards, and regulatory framework** applicable in India.
- Train students to **conduct basic energy audits**, analyze losses, and recommend improvement measures.
- Familiarize students with **co-generation concepts, tariffs, and economic evaluation** for reducing energy costs.

COURSE OUTCOMES (CO):

After successful completion of this course, the students will be able to:

CO1: Explain concepts of energy efficiency, energy conservation, national energy scenario, and regulatory framework in India.

CO2: Apply energy-efficient practices and evaluate energy conservation opportunities in pumping systems, fans, and blowers.

CO3: Explain energy efficiency measures and loss-reduction techniques for air compressors and diesel generator sets.

CO4: Apply energy conservation techniques and innovative measures in industrial and commercial lighting systems.

CO5: Explain energy-efficient electrical machines, drives, co-generation concepts, and tariff systems for reducing energy losses and costs.

CO6: Conduct a basic energy audit, analyze energy flows and losses, and prepare an energy audit report with simple economic evaluation.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

Course Outcomes (COs)	PO1 Basics & Discipline Knowledge	PO2 Problem Analysis	PO3 Design & Development	PO4 Tools, Experimentation & Testing	PO5 Socio-Economic/ Environmental	PO6 Project Mgmt & Communication	PO7 Lifelong Learning	PSO 1	PSO 2
CO1	3	1	—	—	2	—	1	*	*
CO2	2	3	1	1	2	1	1	*	*
CO3	2	2	1	1	2	1	1	*	*
CO4	2	2	—	—	1	1	1	*	*
CO5	2	2	1	—	3	—	1	*	*
CO6	2	3	—	—	2	2	—	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

COURSE CONTENT

Unit – I

(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 – II

(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 – III

(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 –IV

(4 Periods)

Energy Conservation in Lighting System
Replacing Lamp sources
Using energy efficient luminaries
Using light controlled gears
Installation of separate transformers / servo stabilizer for lighting
Periodic survey and adequate maintenance programs
Innovative measures of energy savings in lighting

Unit– V

(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– VI

(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., Venkateshaiah; 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 and Co. New Delhi, 2016, ISBN 9788121905947
7. Singh, Sanjeev; Rathore, Umesh, Energy Management, S K Kataria and Sons, 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.

COURSE OUTCOMES(CO) :

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

CO1: Explain the foundational structures of the Indian Knowledge System, including the Vedas, Upavedas, Vedangas, and Upangas, and discuss their historical significance.

CO2: Relate ancient Indian scientific and technological achievements to modern science and analyze the convergence of science and spirituality.

CO3: Describe the basic principles of Yoga and Holistic Healthcare and evaluate their benefits and potential for integration with modern medicine.

CO4: Analyze case studies to demonstrate the contemporary relevance and practical application of Indian Knowledge Systems in solving modern problems.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Engineering Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PSO2
CO1	1	-	-	-	3	-	2	*	*
CO2	2	2	-	-	2	-	2	*	*
CO3	-	-	-	-	3	2	3	*	*
CO4	1	2	2	-	3	1	2	*	*

Legend: High (3), Medium (2), Low (1) and No mapping (-)

* PSOs will be developed by respective programme coordinator at institute level. As per latest NBA guidelines, formulating PSOs is optional.

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 subjects, teachers should lay emphasis on developing basic understanding of various concepts and principles and procedures involved herein. Teachers 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% 6 Marks
- b) 80 - 85% 8 Marks
- c) Above 85% 10 Marks

iii. * Even Semester:

25 Marks maximum for Sports/NCC/Cultural/Co-curricular/NSS activities as per following: (by In-charge Sports/NCC/Cultural/Co-curricular/NSS)

- a) State/National Level participation
- b) Participation in two of above activities
- c) Inter-Polytechnic level participation

**Odd Semester:

25 Marks maximum

- a) Language Lab Practices / foreign language practices
- b) Group Discussion and Personality Development
- c) Industrial Visits/Industrial Talks
- d) Power Point Presentations and Resume Making
- e) Development of Aptitude and Reasoning Skills
- f) Participation in the technical Exhibitions, Symposia, Seminars, Workshops at the Institute /District/State/National Level.

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 classrooms, tutorial rooms, drawing halls, laboratories, space required for faculty, student amenities and residential area for staff and students.

b) Equipment Requirement:

The 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, planchass with all complete accessories or Latest Configuration	2	35000	35000
2.	MicroscopeDigitalMocroscope - 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
10.	R. B. Twist Tester	2	45000	90000
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 60 TPL 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 (Martindale Type)	1	75000	75000
17.	Laundrometer (For washing fastness testing)	1	80000	80000
18.	Crocko Meter	1	10000	10000
19.	Digital Fibrograph Measuring 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 100°C and facility for smooth variation of temperature inside 27 liters.	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
27.	Crimp Rigidity Tester Minor Load - 2 Gr. to 10Gr. in a step of one grams Major Load - 100 Gr. to 500 Gr. in step of 50 Grams Digital display 220 V, with all complete accessories or Latest Configuration	1	20000	20000
28.	Air Permeability Tester	1	60000	60000
29.	Sheffield Micronaire with compressor (For Fibre Fineness)	1	150000	150000
31.	Miscellaneous Items-Thermometers, Thermo hydrograph, 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		

NOTE:

1. Item No. 17,18,25 and 26 are not required for Textile Technology courses.
2. Indians make working laboratory models for costly equipment be purchased if available.

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 blow room line of 10 inch width or more complete with hopper feeder, Scutcher, beaters with adjustment grid bars, lattice, Krischner neater, Feed regulatory system, calendar rollers, lap rollers, lap tray with electric control panel, 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, cylinder and doffer and other accessories, Mechanical type possibility of processing 50 gms. per batch 10 "width, metallic wire clothing with complete accessories, Microprocessor based individual drive or Latest Configuration	1No.	800000	800000
3.	Draw Frame : Having 3 over 3 drafting arrangement to process the sliver from miniature carding machine with individual AC variable speed motors with change gears 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 over 3 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 drafting arrangement 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 accessories or Latest Configuration	1	480000	480000
5.	Ring Frame Ring Spinning Frame : No. of Spindle 6-12, 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 change gears and other accessories. Mechanical draft 10-50 Microprocessor based or Latest Configuration	1	850000	850000
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 assessoris 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 continuity 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.inRs.
1.	Warp Winding Machines			
	A. Ordinary 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 Dentering Frames (cap. 200 ends) 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
17.	Desk Loom	2	30000	60000
18.	Handloom Warping Machine	1	40000	40000

10. EVALUATION STRATEGY

Evaluation plays an important role in the teaching-learning process. The major objective of any teaching-learning endeavor 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 the 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
- Project Work
- 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-I 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 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 5

Table : Suggested Weightage to be given to different ability levels

Abilities	Weight 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 practical's/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 behavior and it should be followed by viva-voce.

C. Internship / In-House Project/ Industrial Training

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. 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 situations. The formative and summative evaluation may comprise of weightages to performance in testing, general behavior, 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 an 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 the 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. classroom, laboratory, library, and field and execute them in the right perspective. It is emphasized that a proper mix of different teaching methods in all these places of instruction can bring changes in stipulated student behavior as in the curriculum document. It is important for the teachers to understand the curriculum document holistically and further be aware of the intricacies of the teaching-learning process (T-L) for achieving curriculum objectives. Given below are certain suggestions that 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 read them carefully, comprehends and start using them.

(A) BROAD SUGGESTIONS

1. Curriculum implementation takes place at the Programme, course, and classroom level respectively, and synchronization among them is required for its success. The first step towards achieving synchronization is to read the 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 up to the grassroots level. Polytechnics, in turn, are supposed to prepare an institutional academic plan.
3. HOD of every Programme Department along with HODs and in-charges of other departments are required to prepare an academic plan at the department level referring to the institutional academic plan.
4. All lecturers/Senior lecturers are required to prepare course-level and class-level lesson plans referring to the departmental academic plan.

(B) Course Level Suggestion

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 a lesson plan for every theory class. This plan may comprise contents to be covered, learning material for the execution of a lesson plan. They may follow steps for preparing the lesson plan e.g., drawing attention, stating instructional objectives, helping in recalling prerequisite knowledge, delivering planned subject content, checking desired learning outcomes, and reinforcing learning, etc.
3. Teachers are required to plan for expert lectures from the field/industry. Necessary steps are to plan, 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 the course which is abstract in nature, and no other requisite resources are readily available in the institute to impart them effectively.
6. There is a dire need for planning practical experiences in the right perspective. These slots in a course are the avenues to use problem-based learning/activity learning/ experiential learning approaches effectively. The development of lab instruction sheets for the course is a good beginning to provide lab experiences effectively.
7. Planning progressive assessment encompasses periodical assessment in a semester, preparation of a proper quality question paper, assessment of answer sheets immediately, and giving constructive feedback to every student.
8. The student-centered activities may be used to develop generic skills like task management, problem-solving, managing self, collaborating with others, etc.
9. Where 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 of 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.	Sh. Shivendra Yadav, Lecturer Textile Technology	GP Hindalpur, Hapur
2.	Sh. Chandan Singh, Lecturer Textile Technology	GP Hindalpur, Hapur
3.	Sh. Vishesh Kumar, Lecturer Textile Technology	GP Baheri Bareilly
4.	Sh. Pradeep Kushwaha, Lecturer Textile Technology	GP Baheri Bareilly

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 METHODOLOGY

1. EVALUATION METHOD for THEORY

	Internal Assessment (40 marks)				External Assessment (60 marks)
	IA 1	IA 2	IA 3	IA 4	
Mode	Written Test	Written Test	Attendance and Assignments	Pre – Semester Examination	End Semester Examination
Portion	2 units	2 units	Regularly	All units	All units
Duration1hr	1hr	1hr	-	3hrs	3hrs
Exam Marks	20	20	20	60	60
Converted to	10	10	15	15	60
Tentative Schedule	5 th Week	10 th Week	Regularly	12 th -13 th Week	

IA1 and IA2: A written assessment test worth 20 marks should be conducted for two units. The marks earned (20 marks) will be converted to 10 marks. The best of the two assessments will be evaluated for an internal 10-mark assessment.

IA3: Assignments given after the completion of each unit, along with attendance throughout the semester, will be assessed for a total of 15 marks.

IA4: The pre-semester examination should follow the end-semester examination question pattern. The marks should be adjusted to 15 for internal assessment.

2. EVALUATION METHOD for PRACTICAL

	Internal Assessment (60 marks)				External Assessment (40 marks)
	IA 1	IA 2	IA 3	IA 4	
Mode	Practical Test	Practical Test	Attendance and Practical Documentation	Practical Test and Quiz – Viva Voce	Practical Examination
Portion	50% Practical	50% practical	All practical	All practical	All practical
Duration	3hrs	3 hrs	Regularly	3 hrs	3hrs
Exam Marks	20	20	20	20	40
Tentative Schedule	5th Week	10th Week	Regularly	12th -13 th Week	

IA1 and IA2: Complete all exercises and experiments as outlined and retain them for the practical test. The test should be conducted in accordance with the evaluation scheme. The best of the two practical tests will be internally evaluated for a total of 20 marks.

IA3: Maintain a practical file for each exercise while ensuring attendance throughout the semester. Submit the required documents for the practical file, quiz, and practical test along with a valid certificate (Progress Card). This will be assessed for 20 marks.

IA4: The pre-semester practical examination, quiz, and viva-voce should follow the end-semester practical examination pattern, with marks adjusted to 20 for internal assessment.

SUGGESTED DISTRIBUTION OF MARKS FOR INTERNAL EVALUATION

Part	Description	Marks Allotted
A.	Objective	5
B.	Circuit Diagram	5
C.	Procedure and Connections	10
D.	Observation Table and Calculation	10
E.	Result and its Discussion, Conclusion	10
F.	Practical Test	20
	Total	60

SUGGESTED DISTRIBUTION OF MARKS FOR EXTERNAL EVALUATION

Part	Description	Marks Allotted
A.	Objective	5
B.	Circuit Diagram	5
C.	Procedure and Connections	5
D.	Observation Table and Calculation	5
E.	Result and its Discussion, Conclusion	10
F.	Viva-Voce	10
	Total	40

3. EVALUATION METHOD for PRACTICUM (End Exam-Practical)

	Internal Assessment (60 marks)				External Assessment (40 marks)
	IA 1	IA 2	IA 3	IA 4	
Mode	Practical Test	Practical Test	Attendance and Practical Documentation	Micro Project	Practical Examination
Portion	50% practical	50% practical	All practical	All practical	All practical
Duration	3hrs	3 hrs	Regularly	Regularly	3hrs
Exam Marks	20	20	20	20	40
Tentative Schedule	5th Week	10th Week	Regularly	12th -13 th Week	

- **IA1 and IA2:** Complete all exercises and experiments as instructed and retain them for the practical test. The test should be conducted according to the evaluation scheme. The best of the two practical tests will be internally assessed for a total of 20 marks.
- **IA3:** Maintain a practical file for each exercise, ensuring attendance throughout the semester. Submit the required documents for the practical file, quiz, practical test, and end-semester examination, along with a valid certificate (Progress Card). This will be evaluated by 20 marks.
- **IA4:** Submit a micro-project report along with a fabrication model or analysis report. The performance of each student in the group will be assessed by both the laboratory supervisor and an internal examiner. This evaluation will contribute 20 marks.

SUGGESTED DISTRIBUTION OF MARKS FOR INTERNAL EVALUATION

Part	Description	Marks Allotted
A.	Objective	5
B.	Circuit Diagram	5
C.	Procedure and Connections	10
D.	Observation Table and Calculation	10
E.	Result and its Discussion, Conclusion	10
F.	Mini Project	20
	Total	60

SUGGESTED DISTRIBUTION OF MARKS FOR EXTERNAL EVALUATION

Part	Description	Marks Allotted
A.	Objective	5
B.	Circuit Diagram	5
C.	Procedure and Connections	5
D.	Observation Table and Calculation	5
E.	Result and its Discussion, Conclusion	10
F.	Viva-Voce	10
	Total	40

4. EVALUATION METHOD for PRACTICUM (End Exam-Theory)

	Internal Assessment (40 marks)						External Assessment (60marks)
	IA 1		IA 2		IA 3	IA 4	
Mode	Written Test	Practical Test	Written Test	Practical Test	Attendance and Practical Documentation	Pre Semester Examination and Micro Project	End Semester Examination
Portion	2 units	Practical related to the units	2 units	Practical related to the units	All unit	All Practical	All unit
Duration	1hr	3hrs	1hr	3 hrs	3hrs	Regularly	3hrs
Exam Marks	10	20	10	20	60	60	60
	30		30				
Converted to	10		10		15	15	60
Tentative Schedule	5 th Week		10 th Week		Regularly	12 th -13 th Week	

IA1 and IA2: A written assessment test worth 10 marks should be conducted for two **UNITs**. Complete all exercises and experiments as outlined and retain them for the practical test worth 20 marks. The practical test should be conducted in accordance with the evaluation scheme. The total marks earned (30 marks) will be converted to 10 marks. The best of the two assessments will be internally evaluated for a total of 10 marks.

IA3: Attendance and the pre-semester examination should follow the end-semester examination question paper pattern. The marks should be adjusted to 15 for internal assessment.

IA4: Maintain a practical file for each exercise. Submit the required documents for the practical file, quiz/viva-voice, practical test, and end-semester examination, along with a valid certificate (Progress Card). This will be assessed for 40 marks. Additionally, submit a micro-project report along with a fabrication model or analysis report. The performance of each student in the group will be evaluated by both the laboratory supervisor and an internal examiner. The total of 60 marks will be converted to 15 marks.

SUGGESTED DISTRIBUTION OF MARKS FOR INTERNAL EVALUATION FOR IA4

Part	Description	Marks Allotted
A.	Objective	5
B.	Circuit Diagram	5
C.	Procedure and Connections	5
D.	Observation Table and Calculation	5
E.	Result and its Discussion, Conclusion	10
F.	Attendance & Mini Project	10
	Total	40