

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

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

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Semester System

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(EFFECTIVE FROM YEAR 2025-26)

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 the shrinking of the world, bringing people from different cultures and environment 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. The initiatives are being taken by the State Board of Technical Education, UP to revise the existing curricula as per the needs of the industry and make NSQF compliant.

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 programmes. The curricula for diploma programmes have been revised by adopting a time-tested and nationally acclaimed scientific method, laying emphasis on the identification of learning outcomes of diploma programme.

The real success of the diploma programme depends upon its effective implementation. However, best the curriculum document is designed, if that is not implemented properly, the output will not be as expected. In addition to the 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.

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1. ACKNOWLEDGEMENT

We gratefully acknowledge the guidance and contribution received from the following people:

1. Sh. Narendra Kumar Bhushan, IAS Additional Chief Secretary, Technical Education Govt. of U.P. for his exemplary vision & approach.
2. Sh. F. R. Khan Director I.R.D.T. Kanpur continually motivating, guiding and taking keen interest in the review of the curriculum.
3. All the participants from Polytechnics and other technical institutions for their professional input during curriculum workshops.
4. CDC Officer and others concerning staff of IRDT for their support and assistance in conducting curriculum workshops.

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2. SALIENT FEATURES

- | | |
|---|---|
| 1. Name of the Programme | ➤ Diploma in Carpet 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 HOLDERS IN CARPET TECHNOLOGY

Major clusters for carpet production in India are Panipat, Bhadohi, Mirzapur, Bhatinda, Ludhiana etc. There are very few colleges in India that are providing diploma engineering course in 'Carpet Technology'. Industry always required trained diploma engineers for smooth functioning and further development. The students completing this diploma course should get employment opportunities in following work profiles in different carpet producing clusters on India -

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

4. (A) PROGRAM OUTCOMES (POS)

PO1: Basics and Discipline specific Knowledge

Assimilate knowledge of basic mathematics, science, engineering fundamentals, and Carpet 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 OUTCOME OF THE PROGRAM

After undergoing this program, students will be able to

Sr.No.	Learning Outcomes
1.	Prepare and interpret drawings engineering components.
2.	Communicate effectively in English in oral and written form with others.
3.	Apply basic principles of mathematics and science to solve engineering problems.
4.	Learning of basic operation of Eng.
5.	Understanding of properties and identification of Man-Made Textile fibers
6.	Understanding of properties and identification of Natural Textile fibers
7.	Use cutting tools for machines and machine tools.
8.	Carry out welding and different shop floor operation.
9.	To know the origin and history of carpets.
10.	Prepare process plan for given part.
11.	Carry out work measurements and method study to improve productivity.
12.	Apply inventory control techniques to reduce.
13.	Manage activities related to procurement, Stacking, storage, and preservation of materials.
14.	Prepare maintenance schedules.
15.	To learn basic electrical and electronics machines.
16.	Utilize computer and IT tools for document creation, spreadsheet development, and presentation design.
17.	Learning a brief idea of manufacturing of yarn.
18.	Learning manufacturing carpet yarn.
19.	Learning different textile testing instruments and their uses.
20.	Application and development of Basic carpet Design.

21.	Application and development of Advance carpet Design.
22.	To learn different motions of Loom.
23.	To learn machinery involved in manufacturing fabrics.
24.	To different kinds of carpet manufacturing process.
25.	Application of different dyes on Carpet.
26.	To learn different kind of chemical coating and finishing on carpet.
27.	To learn different methods of manufacturing non-Woven.
28.	To learn modern machinery of carpet manufacturing.
29.	Utilize appropriate practices for conserving energy and preventing environmental pollution.
30.	Interpret factory acts and laws.
31.	Manage resources effectively at workplace.
32.	Plan and execute given task/project as a team member or leader.
33.	Prepare detailed project proposal and report.
34.	Solve real life problems by application of acquired knowledge and skills.
35.	Handle the customers effectively.

5. ABSTRACT OF THE CURRICULUM AREAS

a) PROGRAM CORE COURSES

Introduction to Carpet
Carpet Yarn manufacturing
Textile Fibre – I
Carpet Design – I (Lab)
Open Elective I - Advance Skill Development
Non-Woven Technology
Textile Fibres – II
Carpet Manufacturing
Textile Testing (Lab)
Open Elective II - Advance Skill Development

Carpet Finishing and Maintenance
Modern Carpet Technology
Carpet Chemical Processing
Carpet Testing
Carpet Design-II
Entrepreneurship and Start-Ups
In-House Project or Internship or Industrial Training

b) PROGRAM ELECTIVE COURSES

Program Elective -I
1. Principles of Design and Colour
2. Textile Chemical Processing

Program Elective -II
1. Export Management
2. Industrial Safety

Program Elective -III
1. Total Quality Management
2. Fabric Manufacturing System

c) AUDIT COURSE

Essence of Indian Knowledge and Tradition

6. EVALUATION SCHEME FOR DIPLOMA PROGRAMME IN CARPET TECHNOLOGY

THIRD SEMESTER

CARPET TECHNOLOGY (328)

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	INTRODUCTION TO CARPET	PROGRAM CORE (THEORY)	03	-	-	3	40	-	40	60	3	-	-	60	100		
3.2	CARPET YARN MANUFACTURING	PROGRAM CORE (PRACTICUM)	02	-	04	4	40	-	40	60	3	-	-	60	100		
3.3	PROGRAM ELECTIVE - I	PROGRAM CORE (THEORY)	03	-	-	3	40	-	40	60	3	-	-	60	100		
3.4	TEXTILE FIBRE - I	PROGRAM CORE (PRACTICUM)	02	-	04	4	-	60	60	-	-	40	3	40	100		
3.5	CARPET DESIGN – I (LAB)	PROGRAM CORE (PRACTICAL)	-	-	04	2	-	60	60	-	-	40	3	40	100		
3.6	ADVANCE SKILL DEVELOPMENT	(Q) OPEN ELECTIVE-1 (THEORY)	02	-	-	2	50	-	-	-	-	-	-	-	N/A		
		(Q) OPEN ELECTIVE-1 (CERTIFICATION COURSE)					-	-	-	-	-	-	-	N/A			
3.7	SUMMER INTERNSHIP** (4 WEEKS)		-	-	-	2	-	50	50	-	-	-	-	-	50		
#STUDENT CENTERED ACTIVITIES			-	-	12	-	-	50	50	-	-	-	-	-	50		
Total			12		24	20	120	220	340	180		80		260	600		

NOTE: -

(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.

FOURTH SEMESTER
CARPET TECHNOLOGY (328)

Sr. No.	SUBJECTS	COURSE TYPE & CATEGORY	STUDY SCHEME Periods/Week			Credits	MARKS IN EVALUATION SCHEME									Total Marks of Internal & External
							INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT						
			L	T	P		Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot		
4.1	NON-WOVEN TECHNOLOGY	PROGRAM CORE (THEORY)	03	-	-	3	40	-	40	60	3	-	-	60	100	
4.2	PROGRAM ELECTIVE - II	PROGRAM CORE (THEORY)	03		-	3	40	-	40	60	3			60	100	
4.3	PROGRAM ELECTIVE - III	PROGRAM CORE (THEORY)	03	-	-	3	40	-	40	60	3	-	-	60	100	
4.4	TEXTILE FIBRE II	PROGRAM CORE (PRACTICUM)	02	-	02	3	-	60	60	-	-	40	3	40	100	
4.5	CARPET MANUFACTURING	PROGRAM CORE (PRACTICUM)	02		04	4	-	60	60	-	-	40	3	40	100	
4.6	TEXTILE TESTING (LAB)	PROGRAM CORE (PRACTICAL)	-	-	04	2	-	60	60	-	-	40	3	40	100	
4.7	ADVANCE SKILL DEVELOPMENT	(Q) OPEN ELECTIVE-2 (THEORY)	02	-	-	2	50	-	-	-	-	-	-	-	N/A	
		(Q) OPEN ELECTIVE-2 (CERTIFICATION COURSE)						-	-	-	-	-	-	N/A		
4.8	(Q) ESSENCE OF INDIAN KNOWLEDGE AND TRADITION	AUDIT COURSE	02	-	-	-	50	-	-	-	-	-	-	-	N/A	
#STUDENT CENTERED ACTIVITIES			-	-	09	-	-	50	50	-	-	-	-	-	50	
Total			17		19	20	120	230	350	180		120		300	650	

NOTE: -

(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.	CERTIFICATE COURSES
1.	COURSES CONDUCTED BY CENTRE OF EXCELLENCE (ESTABLISHED BY THIRD PARTY AS: - TATA TECHNOLOGIES. etc) (Annexure-1)
2.	COURSES CONDUCTED BY INFOSYS PRINGBOARD
3.	COURSES CONDUCTED BY TCS ION
4.	COURSES CONDUCTED BY OTHER RELEVANT GOVERNMENT, INTERNATIONAL/NATIONAL ORGANIZATION OR PLATFORMS OF REPUTE
5.	COURSES CONDUCTED BY AICTE-ELIS AND CENTRALLY FUNDED TECHNICAL INSTITUTES
6.	COURSES CONDUCTED BY C-DAC
7.	COURSES CONDUCTED BY NEILIT

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.	CERTIFICATE COURSES
1	COURSES CONDUCTED BY CENTRE OF EXCELLENCE (ESTABLISHED BY THIRD PARTY AS: - TATA TECHNOLOGIES. etc) (Annexure-1)
2	COURSES CONDUCTED BY NPTEL OF MINIMUM 02 CREDITS
3	COURSES CONDUCTED BY MOOCS THROUGH SWAYAM
4	COURSES CONDUCTED BY AICTE-ELIS AND CENTRALLY FUNDED TECHNICAL INSTITUTES
5	COURSES CONDUCTED BY THE INSTITUTE OF NATIONAL IMPORTANCE (IIT, NIT,IIT ETC.)
6	COURSES CONDUCTED BY C-DAC.
7	COURSES CONDUCTED BY ISRO E-LEARNING.
8	COURSES CONDUCTED BY OTHER RELEVANT GOVERNMENT, INTERNATIONAL/NATIONAL PLATFORMS OF REPUTE, NEILIT

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.	PRINCIPLES OF DESIGN AND COLOUR
2.	TEXTILE CHEMICAL PROCESSING

PROGRAMME ELECTIVE-2

SR.NO.	SUBJECT NAME
1.	EXPORT MANAGEMENT
2.	INDUSTRIAL SAFETY

PROGRAMME ELECTIVE-3

SR.NO.	SUBJECT NAME
1.	TOTAL QUALITY MANAGEMENT
2.	FABRIC MANUFACTURING SYSTEMS

7. DETAIL CONTENTS OF VARIOUS SUBJECTS

THEORY	3.1 INTRODUCTION TO CARPET	L	T	P
		3	-	-

COURSE OBJECTIVE

The course Introduction to Carpet aims to develop a clear understanding of carpet terminology, functional and aesthetic requirements, and key manufacturing techniques, including handmade and machine-made processes. It enables students to classify carpets based on design, origin, and production methods, while providing insight into the Indian handmade carpet industry in both domestic and export contexts. The course also focuses on major fibers and yarns used in carpets, helping students understand material selection and its impact on product quality and performance.

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.

Students will be able to

CO1 □ Explain basic carpet terminology and functional/aesthetic requirements.

CO2 □ Classify carpets based on manufacturing techniques.

CO3 □ Differentiate carpets based on design and origin (global styles).

CO4 □ Describe the structure and importance of the Indian carpet industry.

CO5 □ Identify and evaluate fibers and yarns used in carpets.

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	1	-	-	-	2	*	*
CO2	3	2	1	-	-	-	2	*	*
CO3	3	2	1	-	-	-	2	*	*
CO4	3	2	1	-	-	-	2	*	*
CO5	3	2	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-I:

(4 Periods)

Basic definitions and terminologies used in carpet manufacture, functional and aesthetic requirements of a carpet.

UNIT-II:

(12 Periods)

Classification of carpets based on manufacturing techniques: Handmade carpets (Knotted, tufted, and flat-woven) and Machine-made carpets (Tufted, woven, knitted, and non-woven)

UNIT-III:

(9 Periods)

Classification of carpets based on design - Afghan carpets, Indian carpets, Persian carpets, Scandinavian carpets, Turkish carpets, Turkmen (Bukhara) carpets, Azerbaijani rug, Oriental carpets in Europe, Spanish carpets, Bulgarian carpets, French carpets, English carpets, Modern carpets.

UNIT-VI:

(8 Periods)

Brief introduction to the handmade carpet sector in India (domestic and exports).

UNIT-V:

(9 Periods)

Major fibers and yarns used in carpets: Nylon, Polypropylene, Wool and wool-blends, Polyester, Acrylic, etc.

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 or carpet type classification). These varied assessment tools will help measure students' knowledge, analytical skills, and application of concepts in real-world contexts.

RECOMMENDED BOOK S

1. Journals and magazines carpet –c- world
2. वस्त्ररेशे –उत्पादन विशेषताएँ एवं उपयोग – DR. D.B. Shakyawar & Dr. M.K. Singh, Abhishek Publication Chandigarh/ New Delhi.
3. Advances in Carpet Manufacture by K. K. Goswami, Woodhead Publishing
4. Journals & Magazines related to carpets
5. Carpet-e-World
6. Carpet Manufacture by Crawshaw
7. Tufted Carpet by Von Moody

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (periods)	Marks Allotted (%)
1.	4	10
2.	12	30
3.	9	20
4.	8	20
5.	9	20
Total	42	100

PRACTICUM	3.2 CARPET YARN MANUFACTURING	L	T	P
		2	-	4

COURSE OBJECTIVE

The practicum course Carpet Yarn Manufacturing aims to develop practical knowledge and technical skills related to wool processing and yarn production for carpets. It focuses on understanding wool characteristics, impurity analysis, and different spinning systems such as woollen, semi-worsted, and worsted. The course provides hands-on exposure to key processing stages including blending, carding, gilling, combing, roving, and spinning, along with machine study and production calculations. It also emphasizes the requirements, properties, and quality parameters of carpet yarns, including count, twist, and bulk, as well as fault identification and remedies. Additionally, the course introduces modern spinning systems and their relevance to carpet yarn manufacturing.

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.

Students will be able to

- CO1 □ Analyze raw wool, determine impurities, and understand different spinning systems.
- CO2 □ Operate and study various yarn manufacturing machines and evaluate their production.
- CO3 □ Determine yarn properties such as count and twist, and assess yarn quality.
- CO4 □ Identify defects in carpet yarn and suggest suitable remedies.

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	3	-	2	-	-	2	*	*
CO2	3	3	2	2	-	-	2	*	*
CO3	3	3	2	2	-	-	2	*	*
CO4	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 Introduction

(08 Periods)

Wool-shearing, clipping, and categorization. Impurities present in wool. Introduction to wool fiber spinning systems: Woollen, semi-worsted, and worsted systems. Flow chart and brief description of each system. Differences between these systems and their utilities.

Practicals:-

1. To determine the impurity percentage present in raw wool fibre.
2. To draw a flow chart of woollen, semi-worsted, and worsted systems.

UNIT-II Various process steps involved in converting wool fibers into yarn: (06 Periods)

Blending, opening, carding, gilling, combing, roving, and ring spinning. Brief description, principle of operation, and objectives.

Practicals:-

1. Study the various parts and settings of a woollen cum semi-worsted card, gilling, combing, roving, and ring spinning machine and their passage of material.
2. Determine the production per hour of a woollen cum semi-worsted carding machine, combing, roving, and ring spinning machine.

UNIT-III Carpet Yarn

(08 Periods)

Requirements of carpet yarn with regards to count, twist, bulk. Faults in carpet yarn and their remedies. Other properties of carpet yarn are required in handmade and machine-made carpets. Specific requirements of cotton, jute, silk, and other yarns used in carpet manufacturing.

Practicals:-

1. Study the twist constant of a woollen ring frame and calculate the twist per inch in yarn.
2. Determine the count of sample given of various yarns.

UNIT-IV Different Spinning System

(06 Periods)

Limitations of the Ring Spinning system, possibilities of new spinning systems for carpet yarn manufacture. Brief idea of friction spinning and properties of these yarns with respect to carpets.

Practicals:-

1. Study the various parts of a mule spinning frame, their function, and the passage of material.

INSTRUCTIONAL STRATEGY

Physical demonstrations of various yarns used in carpets. Conduct industrial visits to carpet yarn spinning mills. Students should prepare a collection of various yarns used in the manufacturing of carpets.

MEANS OF ASSESSMENT

- Assignments and quizzes
- Mid-term and end-term written tests
- Mini models or chart preparation

- Lab work and practical exercises
- Viva-voce

RECOMMENDED BOOKS

1. Worsted Yarn Technology by Eric Oxtoby
2. Miles Collins, Woollen and Worsted Spinning, Abhishek Publications
3. New Spinning Technology by W. Klein
4. C. Vickerman, Woollen Spinning, Abhishek Publications, Chandigarh-17 (India)
5. W.S. Simpson and G.H. Crawshaw, Wool: Science and Technology, Woodhead Publishing Limited, Cambridge, England

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Periods)	Marks Allotted (%)
1	08	30
2	06	30
3	08	20
4	06	20
Total	28	100

THEORY	3.3.1 PRINCIPLE OF DESIGN & COLOUR	L	T	P
		3	-	-

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 .

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: (8 Periods)

Drawing, tracing, enlarging, reducing and transferring of simple and elaborate figures.

UNIT-II: (14 Periods)

Sketching flowers, buds, leaves, geometrical figures and their assembly to obtain an all over effect in fabric. Preparation of sketches for stripped, check, spotted geometric and diaper patterns, suitable for fabrics.

UNIT-III: (8 Periods)

Light and pigment theory of colours. Complementary colours, the chromatic circle. Classification of colours and attributes of the primary and secondary colours according to light and pigment theory. Modification of colours. Colours in combination, general principles of colour contrast, colour harmony, tints, shades and broken hues.

UNIT-IV: (6 Periods)

Application of colour and weave effect.

UNIT-V: (6 Periods)

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

INSTRUCTIONAL STRATEGY

Teachers should show different sketches of leaves, flowers and figures. Teachers should show and prepare chart of light and pigment theory also prepare chart of primary and secondary colour.

MEANS OF ASSESSMENT

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

RECOMMENDED BOOKS

Principle of Design- Watson

WEBSITES FOR REFERENCE:

www.nptel.ac.in

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	8	19
2	14	34
3	8	19
4	6	14
5	6	14
Total	42	100

THEORY	3.3.2 TEXTILE CHEMICAL PROCESSING	L	T	P
		3	-	-

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

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 LifeLong 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

(10 Periods)

General Introduction of following : 1. Impurities in raw cotton, jute, wool and silk, their removal., 2. Cropping, Shearing, Cropping and Gas Singeing 3. Desizing., 4. Scouring of cotton., 5. Bleaching of cotton with Sodium Hypochlorite and Hydrogen peroxide., 6. Scouring of wool., 7. Carbonization of wool., 8. Milling., 9. Crabbing of wool., 10. Decatising., 11. Degumming of silk., 12. Jute retting, Heat setting of synthetic and synthetic blends (object, process, stenter used for the process) (Details of processes are not required)

UNIT-II Mercerisation

(06 Periods)

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

UNIT-III Dyeing

(10 Periods)

1. Classification of dyes according to their mode of application. 2. Dyeing of cotton with direct, Sulphur, vat, solubilized vat, reactive. 3. Dyeing wool and silk. 4. Dyeing of Nylon, acetate and terylene with disperse dyes. 5. Dyeing acrylics with modified basic dyes. 6. Basic idea about dope dyeing. 7. Introduction of natural dyes- vegetables, minerals and animal dyes, dying of wool, silk & cotton with these dyes.

UNIT-IV Printing

(08 Periods)

1. Object of Printing 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

(08 Periods)

Finishing - Elementary knowledge of different finishing processes.

INSTRUCTIONAL STRATEGY

Teachers should show different sketches of leaves, flowers and figures. Teachers should show and prepare chart of light and pigment theory also prepare chart of primary and secondary colour.

MEANS OF ASSESSMENT

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

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	10	30
2	6	10
3	10	30
4	08	20
5	08	10
Total	42	100

PRACTICUM	3.4 TEXTILE FIBRES - I	L	T	P
		2	-	4

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

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 LifeLong 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 Introduction

(06 Periods)

Definitions related to textile fibers. Classification of textile fibers. Difference between staple and filament fibers. Essential and desirable properties of textile fibers. Advantages and disadvantages of natural fibers.

Practicals:-

1. Checking moisture regain of different natural textile fibers using a Shirley moisture meter and reputable brand conditioning oven.

UNIT-II Cotton Fibre

(06 Periods)

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

Practicals:-

1. Identifying cotton fibers under a microscope and drawing their longitudinal and cross-sectional views.
2. Identifying cotton fibers by chemical and physical test.

UNIT-III Jute Fibre

(06 Periods)

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, ramie, banana, leaf fibers) and their applications.

Practicals:-

1. Identifying jute fibers under a microscope and drawing their longitudinal and cross-sectional views.
2. Identifying jute fibers by chemical, physical test.

UNIT-IV Wool Fibre

(06 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. Introduction to other animal fibers (angora fibers, camel hair fibers, goat fibers) and their applications.

Practicals:-

1. Identifying wool fibers under a microscope and drawing their longitudinal and cross-sectional views.
2. Identifying wool fibers by chemical, physical test.

UNIT-V Silk Fibre

(04 Periods)

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

Practicals:-

1. Identifying silk fibers under a microscope and drawing their longitudinal and cross-sectional views.
2. Identifying silk fibers by chemical, physical test.

INSTRUCTIONAL STRATEGY

The subject can be taught through a combination of theoretical and practical approaches. Physical demonstrations of various fibers and yarns used in textiles can help students understand the characteristics and properties of different fibers. Industrial visits to textile factories or labs can provide practical exposure to the subject. Students should also be encouraged to prepare a collection of documents on various textile fibers.

MEANS OF ASSESSMENT

- Assignments and quizzes.
- Mid-term and end-term written tests.
- Mini models or chart preparations.
- Lab work and practical exercises.
- Viva voce (oral examination).

RECOMMENDED BOOKS

1. "वस्त्र रेशे –उत्पादन विशेषताएँ एवं उपयोग" by DR. D.B. Shakyawar & Dr. M.K. Singh, Abhishek Publication Chandigarh/New Delhi.
2. E. P. G. Gohl and L. D. Vilensky, "Textile Science," 2nd Edition, Longman Cheshire, New Delhi, 1983.
3. "A Textbook of Fibres Science and Technology" by S. P. Mishra, New Age International (P) Ltd, 2000.
4. "Textile Fibres" by H.V.S. Murthy, 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	18
2	06	22
3	06	22
4	06	22
5	04	16
Total	28	100

PRACTICAL	3.5 CARPET DESIGN-I	L	T	P
		-	-	4

COURSE OBJECTIVE

The course Carpet Design–I aims to develop fundamental skills in weave design and motif creation for carpet applications. It focuses on enabling students to prepare design drafts and peg plans of basic weaves such as plain, twill, and satin along with their derivatives, and to translate these designs into sample fabric forms. The course also emphasizes the development of creative abilities through the construction of geometrical, floral, and traditional motifs using sketching and coloring techniques. In addition, it introduces students to digital design tools such as Inkscape and GIMP, enhancing their capability to create and modify carpet designs using modern software.

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

Students will be able to

- CO1 □ Prepare design drafts and peg plans for basic weaves and their derivatives..
- CO2 □ Develop woven samples based on designed weaves using yarns.
- CO3 □ Create geometrical, floral, and traditional motifs with proper design principles.
- CO4 □ Apply color concepts and creativity in motif development.
- CO5 □ Use digital tools like Inkscape and GIMP for carpet design development.

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 LifeLong Learning	PSO1	PS O2
CO1	3	2	3	2	2	2	2	*	*
CO2	3	2	3	3	2	2	2	*	*
CO3	3	2	3	3	2	2	2	*	*
CO4	3	2	3	3	2	2	2	*	*
CO5	3	2	3	3	2	2	2	*	*

Legend:High(3),Medium(2),Low (1) andNo 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. Create design draft and peg plan of plain weave and its derivatives on point paper, one of each type. Make 5x5 inches samples of any weave with the help of yarns. Different weave should be made by different students.
2. Create design draft and peg plan of twill weave and its derivatives on point paper, one of each type. Make 5x5 inches samples of any weave with the help of yarns. Different weave should be made by different students.
3. Create design draft and peg plan of satin/sateen weave and its derivatives on point paper, one of each type. Make 5x5 inches samples of any weave with the help of yarns. Different weave should be made by different students.
4. Make different geometrical shapes and forms on sketch book.
5. Make geometrical motifs and colour them on sketch book.
6. Make floral motifs and colour them on sketch book.
7. Make traditional motifs and colour them on sketch book.
8. Learn various tools of inkscape (vector graphics software) or its alternatives useful for carpet designing.
9. Learn various tools of gimp (photo editing software) or its alternatives useful for carpet designing.
10. Develop one motif of each type, geometrical, floral, traditional using inks cape and gimp or their alternative softwares.

THEORY	3.6 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	3.6 PROJECT MANAGEMENT (OE-1)	L	T	P
		2	-	-

COURSE OBJECTIVE

The course Project Management aims to provide a clear understanding of project planning, analysis, and execution. It covers key concepts such as project life cycle, scope–cost–time relationships, and work breakdown structure. The course develops skills in project feasibility analysis, including market, technical, and financial evaluation. It introduces capital budgeting techniques like NPV, IRR, and break-even analysis for effective decision-making. Additionally, it focuses on project scheduling and control using CPM and PERT, along with an overview of modern project management tools.

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.

Students will be able to

CO1 □ Understand project concepts, life cycle, and project planning tools like WBS and priority matrix.

CO2 □ Analyze project feasibility through market research, demand forecasting, and technical analysis.

CO3 □ Prepare financial estimates, cost analysis, and evaluate project profitability.

CO4 □ Apply capital budgeting techniques such as NPV, IRR, and break-even analysis for decision making.

CO5 □ Plan, schedule, and control projects using CPM, PERT, and project management tools.

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	3	2	-	-	3	2	*	*
CO2	3	3	2	-	-	3	2	*	*
CO3	3	3	-	-	-	3	2	*	*
CO4	3	3	-	-	-	3	2	*	*
CO5	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.

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 (%)
I	05	14
II	06	14
III	05	24
IV	06	24
V	06	24
Total	28	100

THEORY	4.1 NON-WOVEN TECHNOLOGY	L	T	P
		3	-	-

COURSE OBJECTIVES

The course Non-Woven Technology aims to provide fundamental knowledge of raw materials, production processes, and properties of non-woven fabrics. It develops an understanding of various web formation and bonding techniques used in non-woven manufacturing. The course also focuses on different finishing processes and functional treatments to enhance fabric performance. Additionally, it equips students with the ability to analyze production methods and material selection for diverse non-woven 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 □ Understand raw materials and properties of non-woven fabrics.
- CO2 □ Explain classification and production processes of non-woven fabrics.
- CO3 □ Analyze different web formation techniques used in non-wovens.
- CO4 □ Evaluate various bonding techniques and their applications.
- CO5 □ Understand finishing processes applied to non-woven fabrics.
- CO6 □ Identify advanced finishing treatments and their functional uses.

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	3	2	-	1	-	2	*	*
CO2	3	3	2	-	1	-	2	*	*
CO3	3	3	2	-	1	-	2	*	*
CO4	3	3	2	-	1	-	2	*	*
CO5	2	2	2	2	1	-	2	*	*
CO6	2	2	2	2	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-I Introduction to Non-woven (06 Periods)

Raw materials: Description of fibrous matters used in non-woven production, Properties of fabrics made from different fibrous matters. Bonding agents used in non-woven.

UNIT-II Classification of Non-woven and Production Steps (06 Periods)

General production steps for manufacturing non-woven fabrics. Dry bonded fabric production steps. Spun bonded fabric production.

UNIT-III Types of Webs and Their Forming Techniques (06 Periods)

Staple fiber webs. Wet-laid webs. Dry-laid webs. Fiber preparation.

UNIT-IV Non-woven Fabric Bonding Techniques (10 Periods)

Mechanical bonding. Needle punching technology. Stitched bonding technology. Hydro entanglement. Adhesive bonding or chemical bonding. Spray adhesive bonding. Foam bonding. Thermal bonding. Hot calendaring. Area bonding. Point bonding. Embossing. Belt calendaring. Through-air bonding.

UNIT-V Finishing of Non-Woven Fabrics (10 Periods)

Introduction to finishing processes for non-woven fabrics. Classification of finish applied to non-woven fabrics. Shrinkage, Wrenching, and Creping. Creeping: The Micrex-Micro creepe process. Process carbonizing. Calendaring: Roller Presses. Perforating and Slitting. - Perforating. - Slitting. Grading. Velouring.

UNIT-VI Additional Finishing Processes (04 Periods)

Antistatic Finish. Antimicrobials. Water repellent finish. Lubricants. UV absorbers and Polymer stabilizers. Flame retardant. Soil release. Optical brighteners.

INSTRUCTIONAL STRATEGY

Teachers may use various teaching aids like presentations, videos to make student become acquainted with various non-woven manufacturing methods. Teacher should explain real life scenarios and how non-wovens have increased usage in modern life. Teachers may arrange an industrial visit to nearby industries manufacturing non-wovens for better understanding of the subject.

MEANS OF ASSESSMENT

- Assignments and quizzes
- Mini project making
- Actual lab and practical work
- Viva-voce

RECOMMENDED BOOKS

1. Manual of Nonwoven R Krema
2. Nonwoven Fabric Technology M Mc Donald
3. Nonwoven technology by Milin patel & Dhruv kumar bramahat.
4. Non woven by P Madhavan moorthi

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	06	16
2	06	16
3	06	16
4	10	18
5	10	18
6	04	16
Total	42	100

THEORY	4.2.1 EXPORT MANAGEMENT	L	T	P
		3	-	-

COURSE OBJECTIVES

The course Export Management aims to provide a comprehensive understanding of international trade practices, export-import procedures, and global market dynamics. It develops knowledge of export documentation, trade regulations, and international laws governing cross-border transactions. The course also focuses on export finance, risk management, and the role of financial institutions. Additionally, it equips students with insights into customs procedures, logistics, and export marketing strategies to effectively operate in global markets.

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 □ Understand the fundamentals of international trade and export-import environment.
- CO2 □ Prepare and analyze export-import documentation and procedures.
- CO3 □ Interpret international trade laws, regulations, and compliance requirements.
- CO4 □ Analyze export finance, payment methods, and risk management strategies.
- CO5 □ Understand customs procedures, logistics, and freight forwarding operations.
- CO6 □ Develop export marketing strategies and identify global market opportunities.

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	-	-	1	-	2	*	*
CO2	3	3	-	2	1	-	2	*	*
CO3	3	3	2	2	1	-	2	*	*
CO4	3	3	2	2	1	-	2	*	*
CO5	3	2	2	2	1	-	2	*	*
CO6	2	2	2	2	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 DETAILS

UNIT–I: Introduction to Export-Import: (07 Periods)

Basics of international trade, significance in economic growth, trade policies and agreements, types of exports/imports, global trade players, export promotion councils, international trade organizations (WTO, IMF, World Bank), and recent trends.

UNIT–II: Export-Import Documentation (07 Periods)

Essential documents (bill of lading, invoice, certificate of origin, etc.), payment terms (letter of credit, advance payment), customs compliance, regulatory procedures, freight forwarders, duty drawbacks, and e-documentation.

UNIT–III: International Trade Laws (07 Periods)

WTO rules, tariff structures, free trade agreements, anti-dumping laws, licensing, IPR issues, foreign exchange regulations, sanctions, customs authorities' role, and legal dispute resolution.

UNIT–IV: Export-Import Finance (07 Periods)

Pre-shipment and post-shipment finance, EXIM Bank, export credit agencies, various payment methods, foreign exchange risk, trade insurance, role of banks, and hedging strategies.

UNIT–V: Customs & Freight Forwarding (07 Periods)

Customs clearance, HS codes, tariff structures, role of brokers, import-export restrictions, warehousing, logistics, shipping terms (FOB, CIF, EXW), and customs duty exemptions.

UNIT–VI: Export Marketing & Entry Strategies (07 Period)

Identifying export markets, market research, entry modes (direct, indirect, joint ventures), buyer behavior, branding, trade fairs, digital marketing, export promotion bodies, and global market challenges.

INSTRUCTIONAL STRATEGY

- Use lectures and presentations to explain key concepts.
- Discuss real trade cases to apply knowledge.
- Promote teamwork through group tasks and discussions.
- Use role plays to practice trade procedures.
- Invite experts to share industry experience.
- Assign projects on export planning and documentation.
- Use digital tools to explore real-time trade practices.

MEANS OF ASSESSMENT

- Quizzes and Tests
- Case Study Analysis
- Group Projects and Presentations
- Role Plays and Simulations
- Assignments and Reports

RECOMMENDED BOOKS

1. Export Management – T.A.S. Balagopal, Himalaya Publishing House
2. Export Import Management – Justin Paul & Rajiv Aserkar, Oxford University Press
3. International Marketing and Export Management – Gerald Albaum & Edwin Duerr, Pearson Education

4. Export Marketing – Francis Cherunilam, Himalaya Publishing House
5. Export–Import Procedures and Documentation – Thomas E. Johnson & Donna Bade, AMACOM
6. A Guide on Export Policy, Procedure & Documentation – M. I. Mahajan, Snow White Publications
7. निर्यात प्रबंधन (Export Management) – डॉ. सी. एल. शर्मा, हिंदी ग्रंथ अकादमी
8. निर्यात-आयात प्रबंधन (Export-Import Management) – डॉ. हरिमोहन प्रसाद, सहोदया प्रकाशन
9. अंतर्राष्ट्रीय व्यापार और निर्यात प्रबंधन (International Business and Export Management) – डॉ. राकेश कुमार, किटाब महल

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	7	16
2	7	18
3	7	16
4	7	18
5	7	16
6	7	16
Total	42	100

THEORY	4.2.2 INDUSTRIAL SAFETY	L	T	P
		3	-	-

COURSE OBJECTIVE

The course aims to provide students with a thorough understanding of industrial safety principles and practices in the textile industry. It covers the importance of safe working conditions, legal and humanitarian considerations, and cost implications of accidents. Students will learn accident prevention theories, identification of unsafe acts and conditions, and methods to mitigate hazards in spinning, weaving, and chemical processing operations. The course also emphasizes the safe handling of materials, machine guarding, ergonomics, electrical safety, fire prevention, and health and welfare measures. Additionally, students will gain knowledge of relevant safety statutes, environmental regulations, and statutory provisions to ensure compliance and promote a safe, productive, and sustainable workplace.

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

Students will be able to

CO1 □ Understand the importance of industrial safety, its economic, social, and humanitarian impact, and the role of management and workers in promoting a safe workplace..

CO2 □ Identify accidents, unsafe acts, unsafe conditions, and hazards, and apply principles and methods of accident prevention.

CO3 □ Analyze safety requirements in spinning, weaving, and other textile operations, including machine guarding, incidental safety devices, and ergonomics of workstations.

CO4 □ Apply safety precautions in chemical processing, including bleaching, dyeing, printing, finishing, and management of chemical hazards and effluents.

CO5 □ Implement safety engineering principles for material handling, electrical safety, fire prevention, illumination, and health and welfare measures in the textile industry.

CO6 □ Understand relevant safety statutes, environmental regulations, and legislative provisions to ensure compliance and promote a safe and sustainable industrial environment.

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 LifeLong Learning	PSO1	PS O2
CO1	3	2	-	3	2	-	2	*	*
CO2	3	3	2	3	2	-	2	*	*
CO3	3	2	-	2	2	-	2	*	*
CO4	3	3	2	3	3	-	2	*	*
CO5	3	2	-	2	3	-	2	*	*
CO6	3	2	2	-	3	-	2	*	*

Legend:High(3),Medium(2),Low (1) andNo 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: (5 Periods)

Need for Industrial Safety - Legal Humanitarian, Economic and Social consideration. Safe working conditions and productivity, Unsafe conditions and Hazards. Cost of accidents- Direct or Indirect social cost, financial cost. Role of management and workers participation in Industrial Safety. Safety management principles and practices.

UNIT-2 Principles Of Accident Prevention: (6 Periods)

Definitions - Accident, Injury, Dangerous occurrences, Unsafe acts, Unsafe conditions and hazards. Theories of accidents prevention, Principles and methods of accidents preventions.

UNIT-3 Safety Precautions in Spinning and Weaving: (8 Periods)

Safeguarding of machines- Statutory provisions related to safeguarding of machinery and working near unguarded machines. Ergonomics of machine guarding. Types of guards and guarding machines in the textile industry. Incidental safety devices. Guarding of machines and safety precautions in Opening, Cleaning, Carding, Drawing, Combing, Fly frame, Ring frames, Rotors (spinning), Winding, Doubling, Warping, Sizing and Weaving operations.

UNIT-4 Safety Precaution in Chemical Process: (8 Periods)

Safety Precautions in Bleaching, Dyeing, Printing, Finishing and Accidental Hazards. Chemical Hazards in Wet Processing. Effluent in textile processing.

UNIT-5 Safety Engineering (10 Periods)

Material Handling:

Ergonomics of material handling, principles of correct methods of lifting objects of different sizes, shapes, and weights with safe use of accessories for manual handling.

Safety aspects of design, construction, and use of material handling machinery used in the textile industry – lifts, forklifts, motor trolleys, overhead cranes, and chain pulleys.

Principles of good illumination at the workplace and its recommended minimum standards. Lighting and colour.

Danger From Electricity:

Safe limits of amperage and voltages. Means for cutting overloads and short circuit protection. earth fault protection. Protection of joints and conductors.

Fire explosion, Common cause for industrial fire detection and alarm. Knowledge of water system, Carbon Dioxide System, Foam Extinguishers system and Dry Chemical Extinguishing Systems for extinguishing fire, Sprinklers.

Health and Welfare:

Health hazards in Textile industry, Occupational diseases. Personal production equipments. Special precautions for specific work environment.

UNIT-6.Safety Statutes:**(5 Periods)**

Employees' welfare and legislation.Indian BoilerAct and Regulation.The Water (Control of Pollution) Act and Rules.The Air (Pollution) Act and Rules.The Noise (Pollution) Act and Rules.

INSTRUCTIONAL STRATEGY

Teachers should take lectures on theory, demonstrate concepts and prototypes

MEANS OF ASSESSMENT

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

BOOKS RECOMMENDED

1. Health and Safety for Textile Industry by R Vettriselvan, T JeyaSudha
2. A Textbook on Industrial Safety by Harsimran Singh Sodhi, Doordarshi Singh

Websites for Reference:

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

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	5	10
2	6	12
3	8	20
4	8	20
5	10	28
6	5	10
Total	42	100

THEORY	4.3.1 TOTAL QUALITY MANAGEMENT (TQM)	L	T	P
		3	-	-

COURSE OBJECTIVES

The course Total Quality Management (TQM) aims to develop a comprehensive understanding of quality concepts, principles, and practices in manufacturing and service sectors. It focuses on quality improvement through customer satisfaction, continuous improvement, and employee involvement. The course introduces essential quality tools, techniques, and standards such as ISO and Six Sigma for process control and improvement. It also emphasizes practical applications of TQM through real-world case studies to enhance organizational performance and productivity.

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

Students will be able to

CO1 □ Understand fundamental concepts, evolution, and cost aspects of quality.

CO2 □ Explain core principles of TQM such as customer focus, leadership, and continuous improvement.

CO3 □ Apply quality tools and techniques for process analysis and improvement.

CO4 □ Understand quality standards, systems, and certifications like ISO and Six Sigma.

CO5 □ Analyze real-world applications of TQM in manufacturing and service industries.

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	1	-	2	*	*
CO2	3	3	2	2	1	-	2	*	*
CO3	3	3	2	2	1	-	2	*	*
CO4	3	3	2	2	1	-	2	*	*
CO5	3	2	2	2	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-I: Introduction to Quality (08 Periods)

Introduces quality, its importance, and evolution, explaining its role in manufacturing vs. services, and covers quality cost (prevention, appraisal, failure).

UNIT-II: Principles of TQM (08 Periods)

Focuses on core principles like customer satisfaction, continuous improvement (Kaizen), employee involvement, leadership, and strategic planning.

UNIT-III: Quality Tools and Techniques (08 Periods)

Introduces basic quality tools (flowcharts, Pareto charts, control charts) and techniques like 5S and lean for process improvement.

UNIT-IV: Quality Standards and Systems (08 Periods)

Explains ISO 9001 standards, quality documentation, audits, certification, and introduces Six Sigma concepts.

UNIT-V: Applications and Case Studies (10 Periods)

Covers TQM applications in manufacturing and service sectors, with case studies from Indian industries on productivity and quality impact.

INSTRUCTIONAL STRATEGY

- Lectures & Visuals: Use slides and diagrams.
- Discussions: Engage in TQM principle discussions.
- Tool Demonstrations: Show practical quality tool use.
- Group Activities: Assign TQM-related exercises.
- Case Studies: Analyze real-world examples.
- Assessments: Conduct quizzes and assignments.

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. "Total Quality Management" **by** D. R. Kiran
2. "Total Quality Management: Text and Cases" **by** Besterfield, Dale H.
3. "Introduction to Quality Control" **by** M. L. Shinde
4. "Total Quality Management: A Practical Approach" **by** V. K. Gupta
5. "Quality Management for Organizational Excellence" **by** Joji P. Nair
6. "Six Sigma for Managers" **by** George Eckes
7. "The Quality Toolbox" **by** Nancy Tague

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

THEORY	4.3.2 FABRIC MANUFACTURING SYSTEM	L	T	P
		3	-	

COURSE OBJECTIVES

The course Fabric Manufacturing System aims to provide fundamental knowledge of processes involved in converting yarns into fabrics. It focuses on preparatory processes such as winding, warping, and sizing, along with the working principles of various loom motions and weaving machines. The course also introduces shedding mechanisms like dobby and jacquard, and basic concepts of knitting technologies. It enables students to understand different fabric formation systems and their applications in textile production.

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 □ Understand preparatory processes involved in fabric manufacturing.

CO2 □ Explain various loom motions and their functions.

CO3 □ Classify and compare different types of weaving machines.

CO4 □ Analyze shedding devices such as dobby and jacquard.

CO5 □ Understand basic concepts of knitting and types of knitted fabrics.

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	1	-	1	-	2	*	*
CO2	3	3	-	2	1	-	2	*	*
CO3	3	3	2	2	1	-	2	*	*
CO4	3	3	2	2	1	-	2	*	*
CO5	3	2	2	2	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 I. Introduction (10 Periods)

Brief introduction to the sequence of different processes involved in the conversion of yarns into fabrics. Brief study and working principles of cheese winding, warp winding, weft winding, warping, and sizing.

UNIT II. Loom Motions (6 Periods)

Introduction to various primary, secondary, and auxiliary motions of a loom.

UNIT III. Weaving Looms (8 Periods)

Classification of various types of weaving machines. Brief Study of handloom, power loom, and elementary knowledge of automatic looms and shuttle less looms.

UNIT IV. Shedding Devices (10 Periods)

Brief study of dobby and Jacquard.

UNIT IV. Knitting (8 Periods)

Introduction to knitted fabrics and various types of knitting concepts (Warp knits and weft knits).

INSTRUCTIONAL STRATEGY

Physical Demonstration of various textile weaving looms and knitting machines. Visits may be conducted for students to different weaving and knitted industries.

MEANS OF ASSESSMENT

- Assignments and quizzes
- Mid-term and End-term written tests
- Mini Model or chart preparation
- Actual lab and practical work
- Viva-voce

RECOMMENDED BOOKS

1. Principles of Weaving by Marks & Robinson
2. Weaving Mechanism by T. Fox
3. Weaving machine and mechanism by Talukdar, Azgaonkar and Sriramulu
4. Woven Fabric Production – I, II NCUTE Publications
5. Knitting Technology: A Comprehensive Handbook and Practical Guide by David J Spencer.
6. Knitting technology by Prof. D.B. Ajgaonkar.
7. Warp Knitting Production S Ray, Melliand.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted(%)
1.	10	20
2.	6	20
3.	8	20
4.	10	20
5.	8	20
Total	42	100

PRATICUM	4.4 TEXTILE FIBERS - II	L	T	P
		2	-	2

COURSE OBJECTIVES

The practicum course Textile Fibres–II aims to develop practical understanding of man-made fibres, including synthetic and regenerated fibres, along with their structure and properties. It focuses on key concepts such as polymer characteristics, fibre formation methods, and manufacturing processes of polyester, polyamide, acrylic, and regenerated fibres. The course provides hands-on experience in fibre identification using microscopic, chemical, and physical testing methods, as well as moisture regain analysis. It enables students to evaluate fibre properties and their suitability for various textile 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 □ Understand classification and properties of man-made fibres and polymer concepts.

CO2 □ Identify polyester fibres using microscopic and testing methods.

CO3 □ Analyze polyamide fibres and evaluate their properties through practical tests.

CO4 □ Identify acrylic fibres and assess their characteristics.

CO5 □ Identify regenerated fibres and understand their manufacturing and properties.

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	-	-	1	-	2	*	*
CO2	3	3	2	2	1	-	2	*	*
CO3	3	3	2	2	1	-	2	*	*
CO4	3	3	2	2	1	-	2	*	*
CO5	3	3	2	2	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-I Introduction of man-made Fibre

(06 Periods)

Classification of man-made fibres, Definition of regenerated and synthetic fibres. Concepts of molecular weight, Degree of Polymerization, Orientation, and Crystallinity. Characteristics of fibre-forming polymers.

Practicals:-

1. Checking moisture regains different synthetic textile fibers using a Shirley moisture meter and a reputable brand conditioning oven.

UNIT-II Polyester Fibre

(05 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.

Practicals:-

1. Identifying polyester fibers under a microscope and drawing their longitudinal and cross- sectional views.
2. Identifying polyester fibers by chemical, Physical test.

UNIT-III Polyamide Fibres

(06 Periods)

History of development. Different types of polyamide fibres. Manufacturing process of Nylon-6 and Nylon-66. Physical and chemical properties of Nylon-6 and Nylon-66. Applications of polyamide fibres.

Practicals:-

1. Identifying polyamide fibers under a microscope and drawing their longitudinal and cross- sectional views.
2. Identifying polyamide fibers by chemical, physical test.

UNIT-IV Polyacrylonitrile (PAN) Fibres

(05 Periods)

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

Practicals:-

1. Identifying of acrylic fibers under a microscope and drawing their longitudinal and cross- sectional views.
2. Identifying of acrylic fibers by chemical, Physical test.

UNIT-V Regenerated Fibres

(06 Periods)

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

Practicals:

1. Identifying viscose fibers under a microscope and drawing their longitudinal and cross-sectional views.
2. Identifying of viscose fibers by chemical, physical test.

INSTRUCTIONAL STRATEGY

- Conduct physical demonstrations of various fibres and yarns used in textiles.
- Organize industrial visits for students.
- Assign students to prepare a document collection of various textile fibres.

MEANS OF ASSESSMENT

- Assignments and quizzes.
- Mid-term and end-term written tests.
- Preparation of mini models or charts.
- Actual lab work and practical assignments.
- Viva-voice examinations.

RECOMMENDED BOOKS

1. "वस्त्र रेशे –उत्पादन विशेषताएँ एवं उपयोग" by DR. D.B. Shakyawar & Dr. M.K. Singh, Abhishek Publication Chandigarh/New Delhi.
2. "Textile Fibre" by Ghol and Valanslk.
3. "A Textbook of Fibres Science and Technology" by S. P. Mishra, New Age International (p) Ltd, 2000.
4. "Textile Fibres" by H. V. S. Murthy, 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	22
2	05	22
3	06	22
4	05	17
5	06	17
Total	28	100

PRACTICUM	4.5 CARPET MANUFACTURING	L	T	P
		2	-	4

COURSE OBJECTIVES

The practicum course Carpet Manufacturing aims to develop practical skills and technical understanding of various carpet manufacturing techniques. It focuses on fundamental concepts, terminology, and structural elements of carpets, along with hands-on experience in hand-knotted, hand-woven, and tufted carpet production. The course provides training in loom setup, yarn preparation, knotting, weaving, and tufting processes. It also emphasizes identification of defects and their remedies, enabling students to evaluate carpet quality and manufacturing efficiency.

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 ☐ Understand carpet terminology, structure, and basic components through practical analysis.

CO2 ☐ Prepare and analyze hand-knotted carpets, including knotting techniques and loom setup.

CO3 ☐ Develop hand-woven carpet samples and understand their manufacturing process.

CO4 ☐ Perform tufting operations and prepare tufted carpet samples. .

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	-	-	1	-	2	*	*
CO2	3	3	3	3	1	-	2	*	*
CO3	3	3	3	3	1	-	2	*	*
CO4	3	3	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.

COURSE CONTENTS

UNIT-I Fundamentals of carpets

(07 Periods)

Classification of carpets, textures, and other relevant features. Introduction to various terms used in the carpet industry (domestic and internationally).

Practical:-

1. Determine the various elements/terms of the given carpet sample.
2. Study of various parts of carpet loom and their functions.

UNIT-II Hand-knotted carpet

(07 Periods)

Types of knots used. Process sequence involved in making hand-knotted carpets – brief description of each process and equipment used in the manufacturing of hand-knotted carpets. Defects arising in hand-knotted carpet manufacturing and their remedial measures.

Practical:-

1. To prepare the warp sheet, mounting and setting of warp yarn on loom for hand knotted carpet.
2. To prepare weft (pile material, lachchi, and tharry) yarn for hand knotted carpet.
3. To study and identify the various types of knots used in hand-knotted carpet and also to determine knots/square inch in a carpet.
4. To prepare a small sample of Tibetan/Persian hand knotted carpet.

UNIT-III Hand-woven carpets

(07 Periods)

Process sequence involved making hand-woven carpets. Brief description of each process and equipment used in the manufacturing of hand-woven carpets. Various types of defects arising in hand-woven carpets and their remedial measures. Brief description of flat-woven carpets manufacturing.

Practical:-

1. To prepare the warp sheet and setting of warp yarn on loom for hand woven carpet.
2. To prepare weft yarn for hand woven carpet.
3. To prepare a small sample of a hand-woven carpet.

UNIT-IV Tufted Carpets

(07 Periods)

Process sequence involved making hand-tufted carpets. Brief description of each process and equipment used in the manufacturing of hand-tufted carpets. Construction of various backing cloth used in tufted carpets.

Practical:-

1. Framing of primary backing, including tracing of design.
2. Practice tufting using hand and electric gun.
3. Preparation of a small sample.

INSTRUCTIONAL STRATEGY

Physical Demonstration of various carpet weaving looms. Students can visit local carpet manufacturing industries and conduct practical trials.

MEANS OF ASSESSMENT

- Assignments and quizzes
- Mid-term and End-term written tests
- Mini Model or chart preparation
- Actual lab and practical work
- Viva-voce

RECOMMENDED BOOKS

1. "Carpet Manufacturing" by G.H. Crawshaw
2. "Tufted Carpet" by Von Moody
3. "Encyclopaedia of Carpet" by B.S. Chauhan
4. "Process Control in Manufacturing Carpet" by KK Goswami (Available in Hindi and English Versions)
5. "Advances in Carpet Manufacture" by KK Goswami

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Periods)	Marks Allotted (%)
1	07	25
2	07	25
3	07	25
4	07	25
Total	28	100

PRACTICAL	4.6 TEXTILE TESTING	L	T	P
		-	-	4

COURSE OBJECTIVES

The practical course Textile Testing aims to develop practical skills in evaluating the physical and mechanical properties of fibers, yarns, and fabrics using standard testing methods and instruments. It focuses on measurement of yarn count, twist, strength, evenness, and fiber characteristics such as length and fineness. The course also provides hands-on experience in testing fabric properties including strength, abrasion resistance, air permeability, crease recovery, and pilling. It enables students to analyze test results, assess quality, and understand the importance of testing in textile production and quality control.

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 □ Determine yarn properties such as count, twist, and evenness using standard methods.
- CO2 □ Evaluate fiber properties including length, fineness, and strength using testing instruments.
- CO3 □ Measure yarn strength and related parameters like CSP and analyze results.
- CO4 □ Assess fabric properties such as strength, abrasion, air permeability, and crease recovery.
- CO5 □ Analyze overall textile quality using different testing techniques and interpret results.

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	3	3	1	-	2	*	*
CO2	3	3	3	2	1	-	2	*	*
CO3	3	3	2	2	1	-	2	*	*
CO4	3	3	2	2	1	-	2	*	*
CO5	3	2	2	2	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. Determining the count of yarn:
 - Using physical balance
 - Using yarn quadrants balance
 - Using Bessley yarn balance
 - Calculating the Coefficient of Variation (CV)
2. Calculating yarn count by wrap reel and calculating CV.
3. Measuring the twist of yarn per inch/meter in double yarn and its individual components using a continuous twist tester and twist and untwist tester.
4. Finding the hank of sliver and roving with the aid of a wrap block machine.
5. Determining the staple length of fiber using a Bare Sorter.
6. Measuring fiber fineness by flowing air through a sample of fiber using a micron Aire.
7. Finding fiber length using an analytical digital fibro graph.
8. Determining the lea strength of cotton yarn using a lea strength tester (power-driven) and calculating the CSP (Count Strength Product).
9. Determining the breaking strength of cotton yarn using a Ballistic strength testing machine.
10. Testing the breaking strength and elongation of a single thread of cotton using a single thread testing machine (hand-driven or power-driven).
11. Examining the bursting strength of a fabric using a bursting strength tester.
12. Evaluating the relative abrasion properties of fabrics using a Martindale abrasion tester.
13. Measuring the breaking strength of different textile fabrics using a cloth strength tester (power-driven).
14. Measuring crimp using a Shirley crimp meter.
15. Determining the air permeability of fabric using an air permeability tester.
16. Measuring the crease recovery of fabric using a crease recovery tester.
17. Finding fiber strength using a stelometer.
18. Testing the pilling of fabrics using a computerized pilling tester.
19. Estimating the final pH value of finished fabric.
20. Testing the evenness of the yarn using an evenness tester.

THEORY	4.7 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 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	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-1:

(6 Periods)

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

Unit-2:

(6 Periods)

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

Unit-3:

(5 Periods)

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

Unit-4:

(5 Periods)

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

Unit-5:

(6 Periods)

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

INSTRUCTIONAL STRATEGY

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

MEANS OF ASSESSMENT

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

REFERENCE BOOKS:

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

SUGGESTED DISTRIBUTION OF MARKS

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

THEORY	4.7 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 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	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 – 1

(4 Periods)

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

Unit – 2

(5 Periods)

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

Unit – 3

(5 Periods)

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

Unit –4

(4 Periods)

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

Unit– 5

(6 Periods)

Energy Efficient Electrical Machines
Need for energy conservation induction motor and transformer
Energy conservation techniques in induction motor by:
Energy conservation techniques in Transformer
Energy Conservation Equipment: Soft starters, Automatic star delta converter, Variable Frequency Drives, Automatic p. f. controller (APFC)
Energy efficient motor; significant features, advantages, applications and Limitations
Energy efficient transformers, amorphous transformers; epoxy Resin cast transformers / Dry type of transformer
Aggregated Technical and commercial losses (ATC), Technical losses; causes and

measures to reduce, Commercial losses: pilferage, causes and remedies
Application of tariff system to reduce energy bill
Co-generation and Tariff; concept, significance for energy conservation

Unit– 6

(4 Periods)

Energy Audit of Electrical Systems

Energy audit (definition as per Energy Conservation Act)

Energy audit instruments and their use

Questionnaire for energy audit projects

Energy flow diagram (Sankey diagram)

Simple payback period, Energy Audit procedure (walk through audit and detailed audit).

Energy Audit report format.

INSTRUCTIONAL STRATEGY

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

MEANS OF ASSESSMENT

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

REFERENCE BOOKS:

1. Guidebooks No. 1 and 3 for National Certification Examination for Energy Managers and Energy Auditors, Bureau of Energy Efficiency (BEE), Bureau of Energy Efficiency (Statutory body under Ministry of Power, Government of India) (Fourth Edition 2015).
2. O.P. Gupta, Energy Technology, Khanna Publishing House, Delhi, Edition 2018, (ISBN: 978-93-86173-683).
3. Henderson, P. D., India - The Energy Sector, University Press, Delhi, 2016. ISBN: 978-0195606539
4. Turner, W. C., Energy Management Handbook, Fairmount Press, 2012, ISBN 9781304520708
5. Sharma, K. V., Venkataseshiaiah; 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	4.8 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) :

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

MEANS OF ASSESSMENT

- Viva -Voce Exam

RECOMMENDED BOOKS

1. Cultural Heritage of India-Course Material, V. Sivaramakrishna, Bharatiya Vidya Bhavan, Mumbai, 5th Edition, 2014
2. Modern Physics and Vedant, Swami Jitatanand, 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 THE 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 |

Participation in the technical Exhibitions, Symposiums, Seminars, Workshops at the Institute /District/State/National Level.

9. RESOURCE REQUIRMENT

A. PHYSICALRESOURCES

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:

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

TEXTILE TESTING LAB (COMMON WITH T.T., T.C., T.E.)

S.No.	Name of Equipment	No.	Rate (₹)	Amt. in (₹)
1.	Baer Sorter (For Fibre Length) Acrylic Transparent Sheet 6"X8"X2 pieces, 3"X8"X2 pieces Fibre Mounting Templates 6"X8"X2 pieces, 3"X8"X2 pieces With tweezers, velvet pad, scales, planchass, and all complete accessories or Latest Configuration	2	20000	40000
2.	Microscope Digital Microscope Magnifying Power 5X, 10X, 20X, 40X, 100X lenses Trinocular biological microscope with fiber cross-section kit, high resolution CCD camera, and imaging software with measurement facilities Scope of use section of fiber or yarn analysis of any fiber, yarn, and fiber 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	130000
3.	Moisture Meter	1	16000	16000
4.	Wrapreel	2	30000	60000
5.	Wrap Block	2	6000	12000
6.	Beesley Balance	4	7000	28000
7.	Quadrant Balance	2	4000	8000
8.	Lea Strength Tester	1	50000	50000
9.	Single Thread Tester (Digital)	1	100000	100000
10.	R. B. Twist Tester	2	25000	50000
11.	One Inch Twist Tester	2	8000	16000

12.	Take Up Twist Tester Yarn test length: 25 mm to 500 mm adjustable (Metric unit) or 1" to 20" Maximum adjustable (Imperial unit) 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 preset 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	50000	50000
14.	Tearing Strength Tester	1	20000	20000
15.	Bursting Strength Tester	1	35000	35000
16.	Abrasion Resistance Tester (Martindale Type)	1	50000	50000
17.	Laundromat (For washing fastness testing)	1	50000	50000
18.	Crock Meter	1	10000	10000
19.	Digital Fibro graph Measuring Principle: Optical Measuring Range: 12.0 to 45. Measuring Accuracy: +/- 0.1 mm Result Output: 2.5% SL, 50% SL, and UR % Front End Language: English Applicable Standard: ASTM D5332, ISO2648, and IS233 Power Supply: Single Phase 220V AC	1	320000	320000
20.	Uster Evenness Tester	1	2000000	2000000
21.	Trash Analyzer	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	70000	140000
24.	Crease Recovery Tester Size of the Test Specimen: 40mm X 15mm Crease Load: 1 Kg (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 g to 10 g Major Load: 100 g to 500 g Digital display, 220 V with all complete accessories or Latest Configuration	1	20000	20000
28.	Air Permeability Tester	1	35000	35000
29.	Sheffield Micronaire (For Fiber Fineness)	1		
30.	Uster Stapler for Fiber Length (Spectrophotometer)	1		
Total				3811000

CARPET DESIGN LAB

S. No.	Item	Quantity	Rate (₹)	Amount (₹)
1.	Pick glass	15	300.00	3,000.00
2.	Scissors	5	500.00	2,500.00
3.	Crimp tester	1	30,000.00	30,000.00
4.	Computer with latest configuration (i5 or higher), RAM 8 GB or higher, 27 Inch Monitor, integrated or separate graphics card, 512 GB or higher SSD. Pre loaded latest windows and office software.	30	1,00,000.00	30,00,000.00
5.	Graphics tablet and pen	30	15,000.00	4,50,000.00
6.	Plotter colour printer 24 inches	01	1,00,000.00	1,00,000.00
7.	Scanner A3 size 600 dpi or higher	01	40,000.00	40,000.00
8.	Coloured inkjet printer	01	20,000.00	20,000.00
9.	Networking	L.S.	60,000.00	60,000.00
10.	Carpet designing CAD software – Galaincha, Nedgraphics or equivalent – multiuser	1	20,00,000.00	20,00,000.00

CARPET TESTING LABORATORY

S. No.	Item	Quantity	Rate (₹)	Amount (₹)
1	Tuft withdrawal tensometer	1	2,00,000.00	2,00,000.00
2	Thickness, static and dyanamic loadin machine	1	50,00,000.00	50,00,000.00
3	Hexapod tumbler tester	1	25,00,000.00	25,00,000.00
4	Carpet Flammibility tester	1	3,00,000.00	3,00,000.00
5	Carpet digital thickness tester	1	2,50,000.00	2,50,000.00
6	Pile height leaf guage	1	20,000.00	20,000.00
7	Carpet wear and abrasion tester	1	20,00,000.00	20,00,000.00
8	Pick glass	10	300.00	3,000.00
9	Electronic weighing balance	1	50,000.00	50,000.00

CARPET MANUFACTURING LABORATORY

S. No.	Item	Quantity	Rate (₹)	Amount (₹)
1	Vertical hand knotting loom with accessories	4	35,000.00	1,40,000.00
2	Horizontal carpet weaving loom with accessories	1	1,00,000.00	1,00,000.00
3	Tibetal carpet weaving loom with accessories	4	35,000.00	1,40,000.00
3	Carpet tufting frame	10	5,000.00	50,000.00
4	Manual tufting gun	20	1,000.00	20,000.00
5	Automatic tufting gun	2	6,000.00	12,000.00
6	Carpet latex mixing machine	1	10,000.00	10,000.00
7	Squeeze for latexing	5	300.00	1,500.00
8	Shearing machine	1	10,000.00	10,000.00
9	Shearing scissors	10	500.00	5,000.00
10	Cutting scissors	10	500.00	5,000.00
11	Sorting scissors	10	500.00	5,000.00
12	Sewing machines	6	12,000.00	72,000.00

CARPET CHEMICAL PROCESSING LAB

S. No.	Item	Quantity	Rate (₹)	Amount (₹)
1.	Water shaker bath – 8 heads	3	80,000.00	2,40,000.00
2.	Blocks for printing	10	500.00	5,000.00
3.	Screens various sizes	20	1,000.00	20,000.00
4.	Screen preparation chemicals	L.S.	10,000.00	10,000.00
5.	Chemicals and dyes as per need	L.S.	50,000.00	50,000.00
6.	LPG gas stove 2 heads	3	3,500.00	10,500.00
7.	LPG cylinder	2	Market rate	Market rate
8.	Printing table 5'x15'	2	35,000.00	70,000.00
9.	Safety equipments – gloves, shoes, goggles etc.	L.S.	50,000.00	50,000.00

TEXTILE FIBRE LAB

S. No.	Item	Quantity	Rate (₹)	Amount (₹)
1.	Projection microscope	1	5,00,000.00	5,00,000.00
2.	Conditioning chamber	1	1,50,000.00	1,50,000.00
3.	Moisture meter	1	40,000.00	40,000.00
4.	Chemistry glassware as per requirements	L.S.	50,000.00	50,000.00q
5.	Spirit lamps	10	800.00	8,000.00
6.	Dessicator	2	10,000.00	20,000.00
7.	Hot air oven	1	80,000.00	80,000.00
8.	Electronic weighing balance	1	50,000.00	50,000.00

CARPET YARN MANUFACTURING LABORATORY

S. No.	Item	Quantity	Rate (₹)	Amount (₹)
1.	Willow machine lab model	1	15,00,000	15,00,000
2.	Wollen cum semi worsted card lab model	1	22,50,000	22,50,000
3.	Gill box/ Gilling machine lab model	1	15,00,000	15,00,000
4.	Worsted comber lab model	1	22,50,000	22,50,000
5.	Woolen spinning frame lab model	1	18,75,000	18,75,000
6.	Rubbing frame lab model	1	15,00,000	15,00,000
7.	Semi worsted/ worsted ring frame	1	22,50,000	22,50,000
8.	Rotor spinning machine lab model	1	18,75,000	18,75,000
9.	Hank reeling machine	1	15,00,000	15,00,000

FABRIC MANUFACTURING LAB

S.No.	Name of Equipment	No.	Rate (₹)	Amt. in (₹)
1.	Warp Winding Machines			
	A. Ordinary Machine with 10 Heads	1	50,000	50,000
	B. Automatic Winding Machine with 10 Heads	1	800,000	800,000
2.	Pirn Winding Machine with 4 Heads	1	40,000	40,000
3.	Warping Machines			
	A. Beam Warping Machine (High Speed)	1	300,000	300,000
	B. Sectional Warping Machine	1	175,000	175,000
4.	Drawing and Denting Frames (cap. 200 ends) Stainless Screen Frame, Capacity 3200 ends with all Complete Accessories or Latest Configuration	2	10,000	20,000
5.	Plain Looms			
	A. Plain Loom for Plain Tappet	1	40,000	40,000
	B. Plain Loom for Other Weave Tappets	1	45,000	45,000
6.	Dobby Looms			
	A. Single (Acting) Dobby Loom	1	150,000	150,000
	B. Double Acting (Double Lift) Dobby Loom	1	150,000	150,000
7.	Jacquard Looms	1		
	A. Loom with Single Lift Single Cylinder		150,000	150,000
	B. Loom With Single Lift Double Cylinder	1	160,000	160,000
	C. Loom With Double Lift Double Cylinder	1	175,000	175,000
8.	Automatic Weaving Machines			
	A. Automatic Pirn Changing Loom	1	200,000	200,000
	B. Automatic Shuttle Changing Loom	1	200,000	200,000
	C. Water Jet Weaving Machine	1	1,200,000	1,200,000
9.	Other Weaving Machines	2		
	A. Hand Looms	1	15,000	30,000
	B. Loom With Circular Multiple Box Motion		100,000	100,000
	C. Loom With Drop Box Multiple Box Motion	1	100,000	100,000
			150,000	150,000
	D. Loom With Terry Motion	1	150,000	150,000
	E. Loom With Pick At Will Motion	1		
10.	Card Cutting Machine	1	25,000	25,000
11.	Sewing Machine	6	8,000	40,000

12.	A. Hand Knotting loom	4	35,000	140,000
	B. Carpet Wearing loom	1	35,000	35,000
	C. Carpet Tufting Frame	10	5,000	50,000
	D. Manual Tufting Guns	20	800	16,000
	E. Automatic Tufting Guns	2	10,000	20,000
13.	Carpet Latex mixing Machine	1	10,000	10,000
14.	Squeegee for latexing	5	200	1,000
15.	Semi-automatic Carpet backing machine	1	2,000,000	2,000,000
16.	Wire Wilton cut and loop pile wearing m/c	1	10,000	10,000
17.	Shearing machine	1	10,000	10,000
18.	Embossing machine	1	10,000	10,000
19.	Edge Binding Machine	1	10,000	10,000
20.	Carpet Embossing Scissors	10	200	2,000

LEARNING RESOURCE MATERIALS

S.No.	Description	Qty.	Approx. Cost (₹)
1.	LCD Projector with Screen	1	50,000
2.	Handicam	1	30,000
3.	Cutting, Binding & Stitching equipment	1	30,000
4.	Desktop Computer with Internet Core i5/i7-760 Processor, Genuine Windows 7 Professional, 18-inch HD Flat Panel Monitor, Optical Mouse, Keyboard & all related media or latest version	1	40,000
5.	Home Theater Support Disc type CD, CDR/CDRW, DVDR/DVDRW, VCD Supported with USB Port Support-DIVX/JPEG/MP3	1	25,000
6.	Commercial PA System 16W-220W output, AC & 24V DC Operated, 5 Mic & 2 Auxiliary input, Speaker output 4 Ohm, 8 Ohm, 17V & 100V	1	20,000
7.	Interactive Board	1	50,000

B. FURNITURE REQUIREMENT

Norms and standards laid down by AICTE -APH (latest) be followed for working out furniture requirement for diploma courses

C. HUMAN RESOURCES:

Weekly work schedule, annual work schedule, student teacher ratio for various group and class size, staffing pattern, work load norms, qualifications, experience and job description of teaching staff workshop staff and other administrative and supporting staff be worked out as per norms and standards laid down by the AICTE

10. EVALUATION STRATEGY

INTRODUCTION

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 a learner's evaluation.

The purpose of student evaluation is to determine the extent to which the general and the specific objectives of the 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 ongoing 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 a topic, subject, semester, or year. The main purpose of summative evaluation is to measure achievement for assigning course grades, certification of students, and ascertaining the accountability of the 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 the educational process, there is a need to improve the standard of summative evaluation with a view to bringing validity and reliability in the end-term examination system for achieving objectivity and efficiency in evaluation.

STUDENTS' EVALUATION AREAS

The student evaluation is carried out for the following areas:

Theory

Practical Work (Laboratory, Workshop, Field Exercises)

Project Work

Professional Industrial Training

A. THEORY

Evaluation in theory aims at assessing students' understanding of concepts, principles, and procedures related to a course/subject and their ability to apply learned 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 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 the most application domains only.

Section-II

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

Section-III

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

Table: Suggested Weightage to be given to different ability levels

Abilities Weightage to be assigned

Knowledge 10-30 percent

Comprehension 40-60 percent

Application 20-30 percent

Higher than application i.e., Analysis, Synthesis, and Evaluation Upto 10 percent

B. PRACTICAL WORK

Evaluation of students' performance in practical work (Laboratory experiments, Workshop practical / field exercises) aims at assessing students' ability to apply or practice

learned 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 weightages to performance on the task, quality of the product, general behavior, and it should be followed by viva-voce.

C. Internship / In-House Project/ Industrial Training

The purpose of the evaluation of project work is to assess students' ability to apply, in an integrated manner, learned 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 weightage to the nature of the project, quality of the product, quality of the report, and quality of the presentation followed by 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 SUGGESTIONS

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

Polytechnic teachers are required to plan various instructional experiences viz. theory lectures, expert lectures, practical lab/workshop guided library exercises, field visits, study tours, camps, etc. In addition, they have to carry out progressive assessments of theory,

assignments, library, practical, and field experiences. Teachers are also required to do all these activities within a stipulated period. It is essential for them to use the given time judiciously by planning all the above activities properly and ensure the execution of the plan effectively.

The 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, considering the departmental academic plan, the 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. The necessary steps are to plan, identify field experts, make correspondence to invite them, take necessary budgetary approval, etc.
4. Teachers are required to plan guided library exercises by identifying course-specific experience requirements, setting time, assessment, etc. The assignments and seminars can be thought of as the 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 from 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 experience effectively.
7. Planning of 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. Wherever possible, it is essential to use activity-based learning rather than relying on delivery-based conventional teaching all the time.
10. Teachers may take the 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 the 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 department concerned 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 of Participants	Organization
1.	Sh. Brijesh Mishra HOD, Textile Chemistry	GP Dibai
2.	Sh. Alok Kumar, Lecturer Textile	GP Sitapur
3.	Sh. Himanshu Maurya, Textile Design	GGP Prayagraj
4.	Sh. Arunabh Agnihotri, Textile Technology	GP Farrukhabad

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