DEPARTMENT OF TECHNICAL EDUCATION (DIPLOMA SECTOR)
UTTAR PRADESH

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

==========
Semester System
==========

(EFFECTIVE FROM YEAR 2025-26)

Prepared By:

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

CONTENTS

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.

F.R. Khan
Director
Institute of Research Development and Training, U.P.
Kanpur

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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Research Assistant
Curriculum In-charge
I.R.D.T. Kanpur

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Curriculum Co-Ordinator
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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) <u>Industrial Training/Internship:</u>

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

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

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

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

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

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

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

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

3. EMPLOYMENT OPPORTUNITIES 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 Periods/Week			Credits	MARKS IN EVALUATION SCHEME								Total Marks of Internal & External
							INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
			L	T	P		Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	
3.1	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	-	-	-	-	-	-	-	**NA**
		(Q) OPEN ELECTIVE-1 (CERTIFICATION COURCE)					-	-	-	-	-	-	-	-	**NA**
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	-	-	-	-	-	-	-	NA
		(Q) OPEN ELECTIVE-2 (CERTIFICATION COURSE)						-	-	-	-	-	-	-	NA
4.8	(Q) ESSENCE OF INDIAN KNOWLEDGE AND TRADITION	AUDIT COURSE	02	-	-	-	50	-	-	-	-	-	-	-	NA
#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 RELEVENT 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

PROGRAME ELECTIVE-1

SR.NO.	SUBJECT NAME
1.	PRINCIPLES OF DESIGN AND COLOUR
2.	TEXTILE CHEMICAL PROCESSING

PROGRAME ELECTIVE-2

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

PROGRAME ELECTIVE-3

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

7. DETAIL CONTENTS OF VARIOUS SUBJECTS

		L	T	P
THEORY	**3.1 INTRODUCTION TO CARPET**	**3**	**-**	**-**

COURSE OBJECTIVES:

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

• Elementary knowledge about carpets

LEARNING OUTCOMES:

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

- Define basic terminologies related to carpets
- Classify types of carpets based on manufacturing technique
- Classify types of carpets based on design
- Summarize various sectors related to handmade carpets in India
- Identify major fibers and yarns used in carpets

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 OBJECTIVES:

Yarn is a fundamental component of carpets, and woolen yarns are most suitable for carpet manufacturing. The manufacturing systems for woolen yarn differ from those of cotton yarn. This course provides necessary knowledge for diploma engineers working in the field of carpet manufacturing.

LEARNING OUTCOMES

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

- Understand the mechanical processing of wool fibers.
- Differentiate between woolen and worsted spinning systems.
- Describe the steps in converting wool fibers to yarn.
- Identify yarn requirements for handmade and machine-made carpets.
- Recognize the properties of cotton, jute, silk, and other yarns used in carpets.
- Understand the limitations of Ring Spinning and explore new spinning systems.
- Explain friction spinning and evaluate its suitability for carpet yarns.

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 woolen, 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 woolen cum semi-worsted card, gilling, combing, roving, and ring spinning machine and their passage of material.
2. Determine the production per hour of a woolen 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 woolen 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

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

LEARNING OUTCOMES

After undergoing the subject, the students will be able to:

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

COURSE CONTENTS

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

LEARNING OUTCOMES

After undergoing the subject, the students will be able to:

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

COURSE CONTENTS

UNIT-I Preparatory Process (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

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

LEARNING OUTCOMES

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

- Understand the desirable properties and classification of textile fibers.
- Comprehend the cultivation of cotton, including different varieties and the morphological structure of cotton fibers.
- Understand the properties of wool fibers, their structure, and their uses.
- Understand and explain the properties of silk fibers, their structure, and their uses.

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

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 OBJECTIVE:

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

LEARNING OUTCOMES:

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

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

COURSE CONTENTS

Unit-1: (6 Periods)

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

Unit-2: (5 Periods)

Sectoral composition of Indian Economy: Issues in Agriculture sector in India, land reforms Green Revolution and agriculture policies of India,

Unit-3: (5 Periods)

Industrial development, small scale and cottage industries, industrial Policy, Public sector in India, service sector in India.

Unit-4: (7 Periods)

Economic Policies: Economic Planning in India, Planning commission v/s NITI Aayog, Five Year Plans, monetary policy in India, Fiscal Policy in India, Centre state Finance Relations, Finance commission in India. LPG policy in India

Unit-5: (5 Periods)

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

INSTRUCTIONAL STRATEGY

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

MEANS OF ASSESSMENT

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

RECOMMENDED BOOKS:

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

SUGGESTED DISTRIBUTION OF MARKS

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

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

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

LEARNING OUTCOMES:
At the end of the course, the student will be able to:
- Understand the importance of projects and its phases.
- Analyze projects from marketing, operational and financial perspectives.
- Evaluate projects based on discount and non-discount methods.
- Develop network diagrams for planning and execution of a given project.
- Apply crashing procedures for time and cost optimization.

COURSE CONTENTS

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

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

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

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

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

INSTRUCTIONAL STRATEGY

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

MEANS OF ASSESSMENT

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

RECOMMENDED BOOKS:

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

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (periods)	Marks Allotted (%)
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 OBJECTIVE

Non-woven is another important and advanced manufacturing technology among all manufacturing techniques. It involves various mechanical and thermal processing manufacturing methods for carpets.

LEARNING OUTCOMES

- Identify and describe various raw materials used in the manufacturing of non-woven fabrics.
- Classify non-woven fabrics based on their structure and manufacturing processes.
- Explain the different web formation techniques employed in the production of non-wovens.
- Analyze and compare various bonding methods used in the fabrication of non-woven fabrics.
- Describe the finishing processes applied to enhance the properties and performance of non-woven fabrics.

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 quizes
- Mini project making
- Actual lab and practical work
- Viva-voce

RECOMMENDED BOOKS

1. Manual of Nonwoven R Krcma
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 aim of this course is to help the student to attain the following industry identified competency through various teaching experiences:
Manage export-import operations using key trade practices, documentation, legal, financial, and marketing strategies.

LEARNING OUTCOMES:

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

- Understand the basics of international trade, its significance in economic growth, key trade agreements, major global players, and current trends.
- Identify essential export-import documents, payment terms, customs compliance procedures, and the role of digital documentation and freight forwarders.
- Understand global trade laws including WTO rules, tariffs, anti-dumping measures, licensing, IPR issues, foreign exchange regulations, and dispute resolution.
- Explain sources of export-import finance, roles of EXIM Bank and credit agencies, payment methods, foreign exchange risk, and hedging strategies.
- Comprehend customs clearance, HS codes, tariff structures, roles of brokers, shipping terms, warehousing, and import-export restrictions.
- Analyze export market selection, entry strategies, buyer behavior, branding, digital marketing, trade fairs, and global market challenges.

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 OUTCOME

The textile industry is one of the major industries of the country. Its safety problems are much different than those of others. So, it is vital to give youngsters willing to enter into this field, knowledge of general principles of industrial safety focusing on problems in the textile industry.

LEARNING OUTCOMES

After completing the course, the students will be able to:

- Interpret and apply legislative requirements, standards, and best practices in a variety of workplaces.
- Apply risk management principles to anticipate, identify, evaluate and control physical, chemical, biological and psychosocial hazards.
- Collect, manage, and interpret information and data to identify trends and issues of occupational safety and health at the workplace.
- Design, support, and evaluate health & safety programs and implement procedures using management principles and processes appropriate to the task.

COURSE CONTENTS

UNIT-I Introduction (08 Periods)

Need for Industrial Safety - Legal Humanitarian, Economic and Social considerations. 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-II Principles of Accident Prevention (08 Periods)

Definitions: Accident, Injury, Dangerous occurrences, Unsafe acts, Unsafe conditions, and hazards. Theories of accident prevention. Principles and methods of accident prevention.

UNIT-III Safety Engineering (10 Periods)

Safeguarding of machines: Statutory provisions related to safeguarding machinery and working near unguarded machines. Principle of machine guarding. Ergonomics of machine guarding. Types of guards and guarding machines in the textile industry. Incidental safety devices. Accidents and hazards, 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. Material Handling: Ergonomics of material handling. Principles of the correct method 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, Forks, Motor Trolleys, Overhead cranes, and Chain Pulleys. Principle of good illumination at the workplace and its recommended minimum standard. Lighting and Color. 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 causes 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.

UNIT-IV Safety Precaution in Chemical Processes (08 Periods)

Bleaching, Dyeing, Printing, Finishing, and Accidental hazards. Chemical hazards in wet processing. Effluent in textile processing. Health and Welfare: Health hazards in the Textile industry. Dust and Fly. Noise generated and control measures. Occupational hazards, Occupational diseases. Personal protective equipment. Health and welfare measures: First Aid Facilities and other welfare measures like Hospital, Clinics. Special precautions for specific work environments.

UNIT-V Safety Status (08 Periods)

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

RECOMMENDED BOOKS

1. The Chain Tester's Handbook - Chain Tester Association of Great Britain, London.
2. Rigging Manual - Construction Safety Association of Ontario, Canada.
3. Handbook of rigging for Construction and industrial operation - W E ROSSANGEL.
4. Report no 67 (1945) - N C Nelson, Great Britain Medical Research Council Industrial Health Research Board.
5. Illumination Engineering Vol. 54 - H R Blackwoll.
6. Forthlight Roofs - V R. & B.K.S. Ind. J.

SUGGESTED DISTRIBUTION OF MARKS

Topic no.	Time Allotted (Periods)	Marks Allotted (%)
1	8	20
2	8	10
3	10	40
4	8	20
5	8	10
Total	**42**	**100**

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

COURSE OBJECTIVES

The objective of this course is to equip diploma students with fundamental knowledge and practical skills in Total Quality Management to enhance product quality, improve processes, and apply quality tools effectively in industrial and service environments.

LEARNING OUTCOMES

- Understand the fundamentals and importance of TQM.
- Apply key TQM principles like customer focus and continuous improvement.
- Use basic quality tools for problem-solving.
- Explain quality standards like ISO 9001 and the role of audits.
- Apply TQM concepts in real-world industrial and service settings.

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 OBJECTIVE

From the title of the paper, it is evident that the knowledge of the manufacturing process is a matter of imperative importance to textile designers. So is the importance of paper.

LEARNING OUTCOMES

After completing this course, the student will be able to:
- Understand the sequence of different processes involved in the conversion of yarns into fabrics.
- Understand various primary, secondary, and auxiliary motions of a loom.
- Understand the classification of various types of weaving machines.
- Understand the different types of shedding devices i.e. Dobby and Jacquard.
- Understand the concept of knitting and various knitted fabrics.

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 OBJECTIVE

Textile fibres are the primary input in the textile industry, and any education in the field of textiles remains incomplete without knowledge of textile fibres. Whether one is a textile technologist or a textile chemist, understanding textile fibres is essential. This course aims to provide a comprehensive understanding of textile fibres for the readers.

LEARNING OUTCOMES

- Upon completing the course, students will be able to:
- Explain the classification of synthetic fibres, including the role of degree of polymerization, molecular weight, and other properties required for fibre-forming polymers.
- Explain the manufacturing process of viscose fibres and their properties.
- Understand and explain different fibre spinning systems, such as melt spinning, solution spinning, dry spinning, etc.
- Explain the manufacturing process and properties of fibres like polyester, polyamide, polypropylene, and other high-performance fibres.
- Explain the manufacturing process of PAN (Polyacrylonitrile) and other high-performance fibres.

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 OBJECTIVE

Carpet manufacturing is an important aspect of carpet making. It can be manufactured by various methods, and studying all these methods is necessary for a diploma engineering student.

LEARNING OUTCOMES

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

- Understand basic types, textures, and terminology related to carpets.
- Identify and explain carpet manufacturing processes: hand-knotted, hand-woven, and tufted.
- Recognize key tools, equipment, and materials used in different carpet-making techniques.
- Detect common defects in carpet production and suggest appropriate remedies.
- Develop basic skills in preparing warp and weft yarns, setting up looms, knotting, weaving, and tufting.

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

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 LEARNING OBJECTIVES:

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

LEARNING OUTCOMES:

Upon completion of the course the students will be able to

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

COURSE CONTENT

Unit-1: (6 Periods)

Introduction: World Energy Use; Reserves of Energy Resources; Environmental Aspects of Energy 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 LEARNING OBJECTIVES:

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

LEARNING OUTCOMES:

Upon completion of the course the students will be able to

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

COURSE CONTENT

Unit – 1 **(4 Periods)**

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

Unit – 2 **(5 Periods)**

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

Unit – 3 **(5 Periods)**

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

Unit –4 **(4 Periods)**

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

Using light controlled gears
Installation of separate 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., Venkataseshaiah; P., Energy Management and Conservation, I K

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

SUGGESTED DISTRIBUTION OF MARKS

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

AUDIT COURSE	4.8 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.

LEARNING OUTCOMES

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

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

COURSE CONTENTS

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

Overview of Indian Knowledge System

Importance and relevance

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

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

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

Unit 3: Yoga and Holistic Healthcare (04 Periods)

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

Unit 4: Case Studies / Assignment (02 Periods)

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

INSTRUCTIONAL STRATEGY

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

MEANS OF ASSESSMENT

- Viva -Voce Exam

RECOMMENDED BOOKS

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

SUGGESTED DISTRIBUTION OF MARKS

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

8. GUIDELINES FOR 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

1. 15 Marks for general behavior and discipline (by HODs in consultation with all the teachers of the department)

2. 10 Marks for attendance as per the following: (by HODs in consultation with all the teachers of the department)
   2.1. 75 - 80% 06 Marks
   2.2. 80 - 85% 08 Marks
   2.3. Above 85% 10 Marks

3. 25 Marks maximum for Sports/NCC/Cultural/Co-curricular/NSS activities as per following: (by In-charge Sports/NCC/Cultural/Co-curricular/NSS)
   3.1. 25 - State/National Level participation
   3.2. 20 - Participation in two of the above activities
   3.3. 15 - Inter-Polytechnic level participation

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.	Spirint 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 B. Automatic Winding Machine with 10 Heads	 1 1	 50,000 800,000	 50,000 800,000
2.	Pirn Winding Machine with 4 Heads	1	40,000	40,000
3.	Warping Machines A. Beam Warping Machine (High Speed) B. Sectional Warping Machine	1 1	300,000 175,000	300,000 175,000
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 B. Plain Loom for Other Weave Tappets	 1 1	 40,000 45,000	 40,000 45,000
6.	Dobby Looms A. Single (Acting) Dobby Loom B. Double Acting (Double Lift) Dobby Loom	 1 1	 150,000 150,000	 150,000 150,000
7.	Jacquard Looms A. Loom with Single Lift Single Cylinder B. Loom With Single Lift Double Cylinder C. Loom With Double Lift Double Cylinder	1 1 1	 150,000 160,000 175,000	 150,000 160,000 175,000
8.	Automatic Weaving Machines A. Automatic Pirn Changing Loom B. Automatic Shuttle Changing Loom C. Water Jet Weaving Machine	 1 1 1	 200,000 200,000 1,200,000	 200,000 200,000 1,200,000
9.	Other Weaving Machines A. Hand Looms B. Loom With Circular Multiple Box Motion C. Loom With Drop Box Multiple Box Motion D. Loom With Terry Motion E. Loom With Pick At Will Motion	2 1 1 1 1	 15,000 100,000 100,000 150,000 150,000	 30,000 100,000 100,000 150,000 150,000
10.	Card Cutting Machine	1	25,000	25,000
11.	Sewing Machine	6	8,000	40,000

12.	A. Hand Knotting loom B. Carpet Wearing loom C. Carpet Tufting Frame D. Manual Tufting Guns E. Automatic Tufting Guns	4 1 10 20 2	35,000 35,000 5,000 800 10,000	140,000 35,000 50,000 16,000 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-1 should be of the order of 20 percent of the total marks, and no choice should be given in this section. The objective type items should be used to evaluate students' performance in knowledge, comprehension, and at the most application domains only.

Section-II

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

Section-III

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

Table: Suggested Weightage to be given to different ability levels

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

B. PRACTICAL WORK

Evaluation of students' performance in practical work (Laboratory experiments, Workshop 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 Method for Practicum Based Course Paper (End Exam: PRACTICAL)

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

NOTE:

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

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

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

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

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

NOTE:

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

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

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

Evaluation Method For THEORY Based Course Paper

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

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

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