

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

**CURRICULUM FOR DIPLOMA PROGRAMME
IN
TEXTILE CHEMISTRY
(5th to 6th Semester)**

=====

Semester System

=====



YEAR 2026-2027

Prepared By:

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

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PREFACE

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

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to carry out job market research on a continuous basis to identify the new skill requirements, reduce or remove outdated and redundant courses, develop innovative methods of course offering and thereby infuse the much-needed dynamism in the system.

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2. SALIENT FEATURES

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

1) **Industrial Training/Internship:**

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

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

2) **Audit & Pathways:**

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

3) **Student Centered Activities:**

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

4) **Project work:**

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

3. EMPLOYMENT OPPORTUNITIES FOR DIPLOMA HOLDERS IN TEXTILE CHEMISTRY

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

(1) Manufacturing Industry

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

- Supervisor and managerial job in yarn dyeing production Industry.
- Production Supervisor in Cotton fiber dyeing Industry
- Production Supervisor in Quality assurance Department.
- Production Supervisor in Continuous Processing state-of-the-art plant. .
- Quality Assurance/Control in textile Mills
- Machine installation and maintenance in Process house.
- Assistance in Research and Development in the Textile Industry.
- Assistance in Production Planning and Control in Textile Industry.
- Production Supervisor in Carpet Processing Industry.
- Inventory Management
- Marketing and Sales
- New Product Development in different types of fabric.
- Production Supervisor in Dyeing and Finishing Process.
- Textile testing Lab in charge
- Production Supervisor in Knitting Industry
- Garment/Apparel Production Management.
- Technical Textile Industry

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

- Lab Technician
- Research Assistant
- Cluster Development Officer
- Supervisor
- Handloom Development officer
- Textile Process Service Centre supervisor

(3) Self Employment

- Khadi Yarn and Fabric Processing Unit.
- Trading Textile Accessories for garment .
- Trading machine Spare parts.
- Trading Fabric.
- Start-up of Garment Manufacturing Unit on a small scale.
- Trading of Dyes and Chemical.
- Trading of Dyed Yarn.
- Trading of Dyed Fiber.
- Start -up Yarn, Fiber Dyeing house.
- Start-up Swing Thread manufacturing small industry.
- Start-up of Special Finished fabric like Fire Retardant, Anti crease, Anti-Static, Odor Finish.
- Start Up of Tie-Die, Block, Screen , Bandhani medium scale printing industry

4. (A) Program Outcomes (POS)

PO1: Basics and Discipline specific Knowledge

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

PO2: Problem's Analysis and solution

Identify, analyse and solve problems using standard methods and established techniques.

PO3: Design and Development

Design solutions for technical problems.

Assist in designing components, systems, or processes to meet specific requirements.

PO4: Engineering Tools, Experimentation, and Testing

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

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

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

PO6: Project Management and Communication

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

PO7: Lifelong Learning

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

4. (B) LEARNING OUTCOMES OF THE PROGRAM

Designing a curriculum for a course in Textile Chemistry requires a comprehensive approach that covers both the fundamental principles of chemistry and their application in the textile industry. Here are some key curriculum areas to consider:

1. Chemistry Fundamentals:
 - Inorganic Chemistry: Introduction to elements, compounds, and chemical reactions relevant to textiles.
 - Organic Chemistry: Study of organic compounds and their relevance in textile fiber and dye chemistry.
 - Physical Chemistry: Thermodynamics, kinetics, and equilibria as applied to textile processes.
2. Fiber Chemistry:
 - Fiber Structure and Properties: Understanding the structure and properties of natural and synthetic textile fibers.
 - Fiber Processing: Overview of spinning, extrusion, and other fiber manufacturing processes.
3. Dye Chemistry:
 - Dye Classification: Study of various types of dyes used in textile applications, such as direct, reactive, vat, and disperse dyes.
 - Dyeing Techniques: Practical knowledge of dyeing techniques including exhaust, pad, and continuous dyeing.
4. Chemical Finishing:
 - Fabric Finishing: Chemical treatments to enhance properties like water repellency, flame resistance, and wrinkle resistance.
 - Printing and Coating: Techniques for applying patterns, designs, and coatings to fabrics.
5. Color Science:
 - Color Theory: Understanding the principles of color perception, color mixing, and color matching.
 - Color Measurement: Practical techniques for color assessment and quality control in textiles.
6. Analytical Techniques:
 - Spectroscopy: Introduction to UV-Visible, IR, and other spectroscopic methods used in textile analysis.
 - Chromatography: Principles and applications of chromatographic techniques in textile chemistry.
7. Environmental and Sustainable Practices:
 - Sustainable Textile Chemistry: Methods to reduce the environmental impact of textile processes, such as wastewater treatment and eco-friendly dyeing.
 - Regulations and Compliance: Understanding and adhering to environmental regulations in textile chemistry.
8. Quality Control and Testing:

- Textile Testing: Techniques for evaluating the physical and chemical properties of textiles.
 - Quality Assurance: Implementing quality control measures in textile production.
9. Polymer Chemistry:
- Polymer Science: Understanding the role of polymers in textile materials and processing.
 - Polymerization Techniques: Study of polymerization methods used in creating synthetic fibers.
10. Textile Product Development:
- Product Innovation: Developing new textiles with desired properties and functionalities.
 - Market Trends: Staying updated on current trends and consumer preferences in the textile industry.
11. Safety and Hazard Management:
- Chemical Safety: Ensuring the safe handling and storage of chemicals used in textile chemistry.
 - Emergency Response: Training for responding to chemical spills and accidents in the workplace.
12. Research and Development:
- Research Methods: Techniques for conducting research in textile chemistry.
 - Innovation and Problem-Solving: Applying chemistry knowledge to solve real-world textile challenges.
13. Internship/Practical Experience:
- Hands-on experience in a textile laboratory or manufacturing facility to apply theoretical knowledge.
14. Capstone Project:
- A research or practical project that integrates the concepts and skills learned throughout the curriculum.
15. Professional Ethics and Communication:
- Ethical considerations in the textile industry.
 - Effective communication skills for working in interdisciplinary teams.

Tailoring the curriculum to the specific needs and goals of the students and considering advancements in textile chemistry and technology is essential for ensuring the program remains relevant and up-to-date. Moreover, collaboration with industry partners can provide valuable insights and opportunities for practical experience.

5. STUDY AND EVALUATION SCHEME FOR TEXTILE CHEMISTRY (348)

FIFTH SEMESTER

TEXTILE CHEMISTRY (348)

Sr. No.	SUBJECTS	COURSE TYPE & CATEGORY	STUDY SCHEME			Credits	MARKS IN EVALUATION SCHEME										Total Marks of Internal & External
			Periods/Week				INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT							
			L	T	P		Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot			
5.1	TECHNOLOGY OF DYEING-II	PROGRAM CORE (THEORY)	03	-	-	3	40	-	40	60	3	-	-	60	100		
5.2	TECHNOLOGY OF DYEING-II LAB	PROGRAM CORE (PRACTICAL)	-	-	06	3	-	60	60	-	-	40	3	40	100		
5.3	TECHNOLOGY OF TEXTILE PRINTING-II	PROGRAM CORE (PRACTICUM)	02	-	04	4	-	60	60	-	-	40	3	40	100		
5.4	TEXTILE PROCESSING CHEMICAL & AUXILIARIES	PROGRAM CORE (THEORY)	03	-	-	3	40	-	40	60	3	-	3	60	100		
5.5	PROGRAM ELECTIVE-3	PROGRAM CORE (PRACTICUM)	02	-	02	3	-	60	60	-	-	40	3	40	100		
5.6	PROGRAM ELECTIVE-4	PROGRAM CORE (THEORY)	02	-	-	2	40	-	40	60	3	-	-	60	100		
5.7	(Q)INDIAN CONSTITUTION	AUDIT COURSE	02	-	-	-	50		50						N/A		
5.8	SUMMER INTERNSHIP** (6 Weeks)		-	-	-	2	-	60	60	-	-	40	3	40	100		
	#STUDENT CENTERED ACTIVITIES	-	-	-	10	-		50	50	-	-	-	-		50		
Total			14	-	22	20	120	290	410	180	-	160	-	340	750		

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

2. ** Students will present a seminar on their summer internship along with certificate, project and report.

3. # 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.

**NORMAL PATHWAY
SIXTH SEMESTER**

TEXTILE CHEMISTRY (348)

Sr. No .	SUBJECTS	COURSE TYPE & CATEGORY	STUDYS CHEME			Credits	MARKS IN EVALUATION SCHEME									Total Marks of Internal & External
			Periods/Week				INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT						
			L	T	P		Th	Pr	Tot	Th	Hr s	Pr	Hrs	Tot		
6.1	TECHNOLOGY OF FINISHING	PROGRAM CORE (THEORY)	04	-	-	4	40	-	40	60	-	-	3	60	100	
6.2	ENTREPRENEURSHIP AND START-UPS	HUMANITIES & SOCIAL SCIENCE	02	-	-	2	40	-	40	60	3	-	-	60	100	
6.3	IN-HOUSE PROJECT	PROJECT	04	-	16	12	-	240	240	-	-	160	-	160	400	
6.4	ADVANCE SKILL DEVELOPMENT	(Q) OPEN ELECTIVE-3 (THEORY)	02	-	-	2	50	-	-	-	-	-	-	-	N/A	
		(Q) OPEN ELECTIVE-3 (Certification Course)					-	-	-	-	-	-	-	N/A		
#STUDENT CENTERED ACTIVITIES			-	-	8	-	-	50	50	-	-	-	-	-	50	
Total			12	-	24	20	80	290	370	120		160		280	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 6.4 in 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.

OR

INDUSTRIAL PATHWAY

Sr. No.	SUBJECTS	CATEGORY & COURSE TYPE	STUDY SCHEME Periods/Week			Credits(C) (L+T)+P=C	MARKS IN EVALUATION SCHEME										Total Marks of Internal & External	ASSESSMENT
							INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT								
			L	T	P		Th	Pr	Tot	Th	Hrs.	Pr	Hrs	Tot				
6.1	ENTREPRENEURSHIP AND START-UPS (ONLINE MODE)	HUMANITIES & SOCIAL SCIENCE (THEORY)	-	-	-	2	-	-	-	100	03	-	-	100	100	THEORY		
6.2	INDUSTRIAL HANDS-ON PRACTICE	INDUSTRIAL TRAINING	-	-	-	12	150*			200**					350			
6.3	INDUSTRIAL PROJECT	INDUSTRIAL TRAINING	-	-	-	4	50*			50**					100			
6.4	SEMINAR	IN HOUSE	-	-	-	2	-	100	100	-	-	-	-	-	100			
Total			-	-	-	20									650			

NOTE:

- The Industrial training tenure should not be less than 14 weeks.
- Industry must be registered with MSME/Directorate of industries/Limited Organization/State/Central Government establishments.
- Monthly progress reports of Intern/ Trainee should be attested and forwarded by industrial supervisor (allotted to Intern/Trainee) during industrial Internship/Training.
- The Industrial unit/organisation must evaluate students using the format provided by polytechnic in the form of marks.
- The Industrial Hands on Practice, Industrial Project and seminar must be evaluated on the basis of the AICTE Internship Policy: Guidelines and procedures (Chapter -9 Procedures / format for organizing internship)
- "Entrepreneurship and Start-up" course is also mandatory in Industrial internship/training mode. It will be conducted online mode by his/her polytechnic institute. After completing the online course, students must appear for exam conducted by the Board of Technical Education, Lucknow.
- *Evaluation by faculty mentor**
The institute will depute one faculty member for mentoring at least 20-30 students undertaking apprenticeship training. Such mentors will monitor, guide and provide counselling to the students as and when required. Faculty mentor of the institute(s) may make a surprise visit to the internship/apprenticeship site to check the student's presence physically. (The Proforma of the evaluation is attached as the Annexure -1)
- ** Evaluation by industry** : The industry shall assess the candidates based on the following parameters attendance, discipline and punctuality, familiarity of tools and material, engineering skills, application of knowledge and problem-solving skills, comprehension and observation, professional ethics, safety and environmental consciousness, communication skills, supervisory skills and general conduct during the period (The Proforma of the evaluation is attached as the Annexure -2)
- # Evaluation through seminar presentation/Viva-Voce at the institute** : The student will give a seminar based on his training report, before an expert committee constituted by the concerned department as per norms of the institute. The evaluation will be based on the following criteria:

OPEN ELECTIVE-3

SR.NO.	(Q) THEORY COURSES NAME
1.	DISASTER MANAGEMENT (Course offered by Polytechnic Institute)
2.	ARTIFICIAL INTELLIGENCE (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.	NPTEL
3.	MOOCS THROUGH SWAYAM
4.	AICTE-ELIS AND CENTRALLY FUNDED TECHNICAL INSTITUTES
5.	C-DAC
6.	CERTIFICATIONS CONDUCTED BY THE INSTITUTE OF NATIONAL IMPORTANCE (IIT, NIT, IIIT ETC.)
7.	ISRO E-LEARNING
8.	OTHER RELEVANT GOVERNMENT, INTERNATIONAL/NATIONAL PLATFORMS OF REPUTE NEILIT
9.	DATABASE MANAGEMENT SYSTEM(ERP) BTRA/NITRA/SITRA/ATIRA/TAI/SASMIRA/WIRA CERTIFICATE PROGRAMME

PROGRAME ELECTIVE-3

SR.NO.	SUBJECT NAME
1.	INTRODUCTION TO KNITTING & GARMENT TECHNOLOGY
2.	INTRODUCTION TO FABRIC STRUCTURE

PROGRAME ELECTIVE-4

SR.NO.	SUBJECT NAME
1.	ADVANCE WET PROCRESSING & PROCESS CONTEROL IN PROCESSING
2.	TECHNICAL TEXTILE & NON-WOVEN

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

6. DETAILED CONTENT OF VARIOUS SUBJECTS

THEORY	5.1 TECHNOLOGY OF DYEING-II	L	T	P
		3	-	-

COURSE OBJECTIVE

The objective of this course is to provide advanced knowledge of dyeing technologies for various classes of dyes and textile materials. The course aims to develop understanding of the principles, chemistry, and application methods of azoic, reactive, pigment, oxidation, mineral, and disperse dyes. It also focuses on dyeing techniques for synthetic fibers and blended fabrics, including carrier dyeing and high-temperature methods. Further, the course emphasizes blend dyeing processes, knitted goods dyeing, and after-treatment operations to improve dye fixation and fastness properties in textile materials.

COURSE OUTCOMES (CO):

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

Students will be able to

CO1 • Explain the principles and methods of dyeing cotton with azoic colours including naphtholation, diazotization, and use of binding agents.

CO2 • Describe the chemistry, classification, and application methods of reactive dyes on cotton, wool, and silk.

CO3 • Explain the dyeing principles and applications of pigment, oxidation, and mineral colours on cotton fabrics.

CO4 • Describe the preparation and dyeing methods of acetate rayon and polyester with disperse dyes, including carrier, HTHP, and Thermosol methods.

CO5 • Explain dyeing methods for common blended fabrics and knitted goods using single-bath and double-bath techniques.

CO6 • Describe after-treatment processes such as soaping, washing, and drying and their role in improving dye fastness properties.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

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

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

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

COURSE CONTENTS

UNIT 1: AZOIC COLOURS:

(08 Periods)

Principle of dyeing and methods of dyeing cotton.

- (a) Naphtholation
- (b) Diazotization of bases.
- (c) Alkali binding agents.
- (d) Stabilized diazofast salts.

UNIT 2: REACTIVE DYESTUFFS:

(08 Periods)

Chemistry and methods of dyeing cotton, wool and silk. Classification of Reactive dyes, Brief description of Vinyl Sulphone, Bi-functional, HE and ME Reactive Dyes.

UNIT 3: VARIOUS TYPE OF COLOURS:

(08 Periods)

- (i) PIGMENT COLOURS: Chemistry of Dyeing of cotton with Pigments Colours.
- (ii) OXIDATION COLOURS: Aniline black their application to cotton.
- (iii) MINERAL COLOURS: Aniline black their application to cotton.

UNIT 4: DISPERSE DYESTUFF:

(08 Periods)

- i. Preparation and dyeing of acetate rayons with disperse colours.
- ii. Preparation and dyeing of polyester fibre with disperse dyes by various methods, i.e. Conventional carrier, high temperature high pressure and Thermosol method.
- iii. Nature and classification of carriers in chemicals. Mechanism involved in carrier dyeing for polyester with its advantages and disadvantages.

UNIT 5: BLEND DYEING:

(08 Periods)

Dyeing of Polyester/Cotton, polyester/wool, cotton/silk, wool/acrylic etc. popular blends with single bath and double bath method. Dyeing of Knitted goods

UNIT 6: AFTER TREATMENT:

(02 Periods)

Soaping, washing and drying of goods.

INSTRUCTIONAL STRATEGY

Teacher should take theory lecture, demonstration of concepts and prototype

MEANS OF ASSESSMENT

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

RECOMMENDED BOOKS

1. Bleaching, mercerizing and Dyeing of Cotton Materials – R.S.Prayag
2. Dyeing of wool, silk and manmade fibers- R.S.Prayag
3. Technology of Dyeing- V.A. shenai

Websites for Reference:

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

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	8	20
2	8	20
3	8	20
4	8	20
5	8	14
6	2	6
Total	42	100

PRACTICAL	5.2 TECHNOLOGY OF DYEING-II	L	T	P
		-	-	6

COURSE OBJECTIVE

The objective of this laboratory course is to provide advanced practical training in dyeing of cotton, silk, acetate, polyester, polyamide, polyacrylic, and blended fabrics using various classes of dyes such as azoic, reactive, pigment, disperse, and basic dyes. The course aims to develop hands-on skills in different dyeing methods including exhaustion, padding, pad-batch, pad-dry-cure, carrier dyeing, high-temperature dyeing, and thermosol processes. It also focuses on shade matching, colour matching, cross dyeing, reserve dyeing, and understanding machine operations to achieve accurate and reproducible dyeing results.

COURSE OUTCOMES (CO):

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

Students will be able to

CO1 • Perform dyeing of cotton and silk with azoic and reactive dyes using exhaustion, padding, pad-batch, and pad-dry-cure methods.

CO2 • Carry out dyeing of cotton with pigment and mineral colours and evaluate fixation and shade development.

CO3• Perform dyeing of acetate, polyester, polyamide, and polyacrylic fibers using disperse and basic dyes by carrier, high-temperature, and thermosol methods.

CO4 • Carry out dyeing of blended fabrics using single-bath, cross-dyeing, and reserve dyeing techniques and analyze shade variation.

CO5 • Prepare compound shades and perform shade matching and colour matching while demonstrating understanding of prescribed dyeing machines.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

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

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

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

LIST OF PRACTICALS

1. Dyeing of cotton and silk with azoic colours by exhaustion and padding.
2. Dyeing of cotton with cold and hot brand reactive dyes by exhaustion, pad batch and pad dry cure.
3. Dyeing of cotton with pigment dyes.
4. Dyeing of mineral Khaki on cotton.
5. Dyeing of acetate rayon with disperse dyes.
6. Dyeing of polyamide fibers with dispersed acid dyes.
7. Dyeing of polyester with dispersed dyes with and without carrier, high temperature and thermosol method.
8. Dyeing of Polyacrylic with basic dyes.
9. Dyeing of blends of cots-wool, terry-wool, polyester-cotton (solid shade, cross dyeing and reserve dyeing).
10. Demonstration and preparation of line diagrams of prescribed machines in theory.
11. Dyeing of compound shades and shade matching.
12. Colour matching.

PRACTICUM	5.3 TECHNOLOGY OF TEXTILE PRINTING -II	L	T	P
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COURSE OBJECTIVE

The objective of this course is to provide advanced knowledge of textile printing techniques for wool, silk, synthetic fibers, blended fabrics, and special textile materials. The course aims to develop understanding of various dye classes used in printing and different printing styles such as direct, discharge, and resist printing. It also focuses on modern and specialty printing techniques including transfer printing, digital printing, flock, foam, spray, batik, and camouflage printing. The course prepares students to understand printing processes for non-wovens, hosiery goods, bonded fabrics, and yarn printing with emphasis on application methods and quality control.

COURSE OUTCOMES (CO):

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

Students will be able to

CO1 • Explain the principles and methods of printing wool and silk using reactive, acid, and metal complex dyes in direct, discharge, and resist styles.

CO2 • Describe printing techniques for synthetic fibers and blended fabrics using appropriate dye classes and printing styles.

CO3 • Explain the principles, processes, and applications of specialty printing techniques such as raised, flock, foam, spray, batik, brasso, and Kalamkari printing.

CO4 • Describe the fundamental principles and machinery involved in sublimation transfer printing and digital (inkjet) printing.

CO5 • Explain printing techniques for non-wovens, hosiery goods, bonded fabrics, camouflage printing, and yarn printing.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

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

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

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

COURSE CONTENTS

UNIT 1. PRINTING OF WOOL AND SILK:

(05 Periods)

Printing of wool and silk with different dye classes such as reactive, acid, metal complex dyes using the direct, discharge and resist styles.

Practicals:-

Printing of wool and silk by acid dyes

UNIT 2. PRINTING OF SYNTHETIC AND BLENDS:

(05 Periods)

Printing in different styles on polyester, nylon, acrylic and their blends such as P/V, P/C, wool/acrylic, wool/nylon and different types of union fabrics-cotton/wool, cotton/silk etc with different dye classes.

Practicals:-

1. Printing of synthetic fiber fabrics
2. Printing of blends.

UNIT 3. OTHER TECHNIQUES OF PRINTING:

(08 Periods)

Raised, Metal and Flock printing, foam printing, Bubble printing etc., Spray printing, Tie and dye, Batik printing, Brasso printing, Crepe, Kalamkari printing.

Practicals:-

1. Printing of cotton by spray printing
2. Printing of cotton by Tie and dye, Batik printing
3. Printing of cotton by Kalamkari printing.

UNIT 4. TRANSFER PRINTING:

(05 Periods)

Fundamental principles of transfer printing, Sublimation Transfer printing of polyester, machines used. Digital printing - Inkjet printing, concept and practice.

Practicals:-

Printing of cotton by transfer printing.

UNIT 5.

(05 Periods)

Printing of non wovens, hosiery goods and bonded goods, camouflage printing, yarn printing.

INSTRUCTIONAL STRATEGY

Teacher should take theory lecture, demonstration of concepts and prototype

MEANS OF ASSESSMENT

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

SUGGESTED DISTRIBUTION OF MARK

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	05	18
2	05	18
3	08	28
4	05	18
5	05	18
Total	28	100

THEORY	5.4 TEXTILE PROCESSING CHEMICALS AND AUXILIARIES	L	T	P
		3	-	-

COURSE OBJECTIVE

The objective of this course is to provide comprehensive knowledge of textile processing chemicals and auxiliaries used in various stages of textile wet processing. The course aims to develop understanding of the classification, properties, functions, and applications of surfactants, sequestering agents, and other auxiliaries used in scouring, bleaching, mercerizing, dyeing, printing, and finishing operations. It also emphasizes surface activity, wetting, detergency, biodegradability of surfactants, and evaluation methods of important auxiliaries to ensure effective, economical, and environmentally responsible textile processing.

COURSE OUTCOMES (CO):

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

Students will be able to

- CO1 • Explain the classification, properties, and functions of textile auxiliaries used in textile processing.
- CO2 • Describe surface activity, wetting, detergency, biodegradability of surfactants, and the role of sequestering agents.
- CO3 • Explain the functions and applications of auxiliaries used in scouring, bleaching, mercerizing, dyeing, and printing processes.
- CO4 • Evaluate important textile auxiliaries such as wetting agents, detergents, and leveling agents using standard testing methods.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

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

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

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

DETAILED CONTENTS

Unit-1:

(12 Periods)

1. Introduction to textile auxiliaries, Meaning of the term and their function.
2. Classification of textile auxiliaries according to their use.
3. Surface activity, wetting and detergency.
4. Biodegradability of surfactant.
5. Sequestering agents
6. Function, Properties and Application of auxiliaries in scouring, bleaching, mercerizing.

Unit-2: DYEING & PRINTING AUXILIARIES :

(10 Periods)

Functions, Properties and application of various dyeing and printing auxiliaries with examples.

Unit-3: FINISHING AUXILIARIES

(10 Periods)

Functions, Properties and application of various finishing auxiliaries with examples.

Unit-4: EVALUATION :

(10 Periods)

Evaluation of some important textile auxiliaries such as wetting, Detergency, leveling agents, etc.

INSTRUCTIONAL STRATEGY

Teacher should take theory lecture, demonstration of concepts and prototype

MEANS OF ASSESSMENT

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

RECOMMENDED BOOKS

Technology of Textile Processing Volume V, Chemistry of Textile Auxiliaries.- V.A.Shenai

Websites for Reference:

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

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	12	28
2	10	24
3	10	24
4	10	24
Total	42	100

PRACTICUM	5.5.1 INTRODUCTION TO KNITTING AND GARMENT TECHNOLOGY	L	T	P
		2	-	2

COURSE OBJECTIVE

The objective of this course is to provide fundamental knowledge of knitting technology and garment construction processes. The course aims to develop understanding of knitting mechanisms, types of knitting needles, loop formation, stitches, and classification of knitted fabrics. It also focuses on garment classification, fabric selection, body measurements, pattern drafting, grading, and garment construction techniques. Further, the course introduces sewing technology, components of garments such as sleeves and collars, and common stitching defects to build practical and technical skills in knitting and apparel production.

COURSE OUTCOMES (CO):

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

Students will be able to

CO1 • Explain basic concepts of knitting, compare woven and knitted fabrics, and describe warp and weft knitting mechanisms.

CO2 • Identify different types of knitting needles and explain loop formation and needle positions in knitting machines.

CO3 • Classify stitches and knitted fabrics such as single jersey and double jersey, and explain factors affecting weft knitting production.

CO4 • Describe garment classification, fabric selection, and apply appropriate body measurement techniques for garment construction.

CO5 • Develop basic patterns, perform pattern drafting and grading, and identify fitting problems with suitable remedies.

CO6 • Explain garment components, spreading and cutting processes, sewing technology, and identify stitching defects with corrective measures.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

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

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

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

COURSE CONTENTS

Unit-1: KNITTING :

(04 Periods)

Introduction and general terms of knitting, Difference in woven and knitted fabrics, properties-knit Vs woven. Warp and weft knitting-mechanism and comparison.

Practicals:-

1. Study of construction and working of knitting machine Parts

Unit-2: KNITTING NEEDLES & LOOP FORMATION WITH NEEDLE :

(04 Periods)

Beard, Latch, Compound type of knitting needles, Advantages and disadvantages of beard and latch type. Running position, clearing position, Feeding position, Knocking over positions, Knitting position.

Practicals:-

1. Study of Different Types of Knitting Needles: Beard, Latch, and Compound Needles

Unit-3: STITCHES & TYPES OF LOOPS:

(06 Periods)

Knit, tuck and floats and its comparison. Types of loops, Classification of weft knitted fabrics - single knit (single jersey), Double knit (double jersey), Factors responsible for production is weft knitting machine.

Practicals:-

1. Classification of stitch, Types of seams sewing tools and part of sewing machine.
2. Identification and Characteristics of Single Jersey (Single Knit) Fabric
3. Identification and Characteristics of Double Jersey (Double Knit) Fabric

Unit-4: GARMENT CLASSIFICATION :

(06 Periods)

Garment classification for men and women. Fabric selection for garment and properties. Measurement and its importance, Methods of taking important body measurements for gents and ladies garments.

Practicals:-

1. Study of Various Fabric Types Used for Gents and Ladies Garments
2. Comparison of Measurement Methods: Manual vs. Digital Technique

Unit-5: PATTERNING AND GRADING:

(04 Periods)

Patterning, importance of paper patterns, Types of patterns, Study of pattern drafting, Identification of fitting problems and its remedy.

Practicals:-

Application of the principle and technique of pattern making for design and construction of –

1. Blouse
2. Ladies suit
3. Gents shirts
4. Pant.

Unit-6:**(04 Periods)**

Types of Sleeves, Collars, Pockets, etc. Spreading, Cutting and Sorting. Sewing Technology, Stitching Defects & their Remedies.

Practicals:-

1. Drafting of different types of sleeves and collars.

INSTRUCTIONAL STRATEGY

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

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. Knitting Technology by Ajgaonkar
2. Fundamentals and advances in knitting technology by H C Ray
3. Garment manufacturing process practices and technology by Prasanta Sarkar

Websites for Reference:

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

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	4	14
2	4	14
3	6	22
4	6	22
5	4	14
6	4	14
Total	28	100

PRACTICUM		L	T	P
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	5.5.2 INTRODUCTION TO FABRIC STRUCTURE	2	-	2
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COURSE OBJECTIVE

The objective of this course is to provide fundamental knowledge of fabric structures with special emphasis on woven fabrics and their construction principles. The course aims to develop understanding of basic weaving terminology, weave design, drafting, lifting plans, and denting order. It also focuses on the construction and analysis of plain, twill, satin, sateen, and decorative weaves, along with calculation of fabric parameters such as GSM. The course integrates theoretical concepts with practical drafting skills to enable students to design, analyze, and interpret various woven fabric structures.

COURSE OUTCOMES (CO):

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

Students will be able to

CO1 • Explain different types of fabric structures and define basic weaving terms such as warp, weft, ends, picks, draft, design, and peg plan.

CO2 • Construct plain weave and its derivatives (matt/hopsack and rib weaves) and demonstrate the relationship between design, draft, and lifting plan.

CO3 • Design and analyze various twill weaves including regular, pointed, broken, herringbone, and fancy twills using appropriate drafting methods.

CO4 • Construct satin and sateen weaves (regular and irregular) and design decorative weaves such as honeycomb, diamond, diaper, mock-leno, and related structures.

CO5 • Calculate fabric weight (GSM) and design miscellaneous woven structures such as sponge, Devon huck, barley corn, stitched hop-sack, twilled hop-sack, stripe, and check weaves.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

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

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

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

COURSE CONTENTS

UNIT-1 INTRODUCTION AND PLAIN WEAVE

(08 Periods)

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

- i. Definition of Warp and Weft, Ends and Picks. Determination of warp and weft in a given fabric. Design, repeat of a design, Draft, Lifting or Peg plan and Denting order, Types of drafts used in the manufacture of the fabrics.
- ii. Construction of plain weaves on point or graph paper. Relation of draft, design and peg plan.
- iii. Construction of plain weave and its derivatives in the form of simple Matt or Hopsack and Ribbed Structures.

Practical:

1. Determination of Number of Ends and Picks per Inch in a Given Fabric Sample.
2. Practical Drafting and Lifting Plan Preparation for Basic Weaves on Graph Paper.
3. Construction of Plain Weave and Its Derivatives: Matt (Hopsack) and Rib Structures.
4. Graphical Representation and Design of Basic and Derived Woven Structures.

UNIT-2 TWILL WEAVES:

(05 Periods)

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

Practical

Construction and Study of Continuous Regular Twill Weave

1. Construction and Study of Continuous Regular Twill Weave
2. Construction and Analysis of Pointed Twill Weave
3. Construction of Fancy Twill Weaves
4. Practical Drafting and Peg Plan of Regular, Broken, and Herringbone Twills

Unit-3 SATIN AND SATEEN WEAVE

(05 Periods)

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

practical

1. Construction of Regular and Irregular Satin Weaves on Graph/Point Paper
2. Construction of Regular and Irregular Sateen Weaves and Their Drafting
3. Design and Construction of Diamond Weaves on Pointed Draft
4. Design and Construction of Diaper Weaves Using Pointed Draft
5. Construction and Analysis of Simple Honeycomb Weave
6. Construction and Comparison of Twilled Hopsack and Simple Hopsack Weaves

Unit-4 FABRICS:**(05 Periods)**

Calculation of fabric weight (GSM).

Unit-5 MISCELLANEOUS WEAVES**(05 Periods)**

Design of following weaves only.

- i. Sponge weaves
- ii. Devon huck
- iii. Barley Corn
- iv. Stitched hop-sack
- v. Twilled hop-sack
- vi. Stripe and Check Weave

INSTRUCTIONAL STRATEGY

Teachers should take theory lecture, demonstrate concepts and prototype

MEANS OF ASSESSMENT

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

RECOMMENDED BOOKS

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

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	08	28
2	05	18
3	05	18
4	05	18
5	05	18
Total	28	100

THEORY	5.6.1 ADVANCE WET PROCESSING & PROCESS CONTROL IN PROCESSING	L	T	P
		2	-	-

COURSE OBJECTIVE

The objective of this course is to develop advanced knowledge of wet processing operations with emphasis on process control, quality management, and recent technological developments in textile processing. The course aims to familiarize students with quality control systems such as TQC, TQM, and Six Sigma, along with process control in preparatory, dyeing, printing, and finishing operations. It also focuses on eco-friendly processing technologies, sustainable chemicals, modern machinery, digital printing, energy conservation, and environmental standards to prepare students for efficient, sustainable, and quality-oriented textile wet processing industries.

COURSE OUTCOMES (CO):

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

Students will be able to

CO1 • Define quality, quality control, and process control, and explain the importance of TQC, TQM, and Six Sigma in textile wet processing industries.

CO2 • Apply process control techniques in preparatory, dyeing, printing, and finishing processes to achieve consistent product quality.

CO3• Identify faults in desized, scoured, bleached, dyed, printed, and finished fabrics, and recommend appropriate corrective and preventive measures.

CO4 • Explain the role of computerized color matching systems, modern dyeing technologies, and quality certification standards such as ISO 9001 and ISO 14001 in textile processing.

CO5 • Evaluate recent developments in textile wet processing including eco-friendly dyes, continuous processing ranges, liquid ammonia mercerization, soft flow dyeing, RFT concept, digital printing, and energy conservation techniques for sustainable and efficient production.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

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

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

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

COURSE CONTENTS

Unit – 1: PROCESS CONTROL :

(14 Periods)

Define quality, quality control and process control with its role, Scope and importance.

1. Importance of total Quality Control (TQC) and Total Quality Management (TQM) system.
2. Brief study of Six Sigma Concept.
3. Process Control in Preparatory Process
4. Process Control in dyeing, printing and finishing.
5. Faults found during inspection of desized, scoured, bleached, dyed, printed and finished fabrics their causes and remedial measures.
6. Computerized color matching machine and Computer Application in Textile Wet Processing Industry.
7. Organizations for Standard Quality Certification ISO 9001 (Quality Product), ISO 14001 (Environment), etc.

Unit – 2: RECENT DEVELOPMENT :

(14 Periods)

Development in Eco-friendly dyes to satisfy the eco-parameters. Role of dyestuff manufacturing companies to reduce impact on environment. Brief study of Toxic intermediates and banned azo dyes.

1. Environment friendly chemicals, application of enzymes. Bio desizing, Bio scouring, Bio Polishing of textiles.
2. Brief description of Continuous Bleaching Range, Continuous Dyeing Range. D. Solvent dyeing techniques. Methods of Mercerization-Liquid ammonia.
3. Soft flow dyeing machine for woven and knitted fabrics.
4. Right First Time (RFT) concept in dyeing,
5. Kuster Dyeing Padding Mangle Technology used in modern dyeing machine.
6. Energy conservation in wet processing.
7. Digital Printing

INSTRUCTIONAL STRATEGY

Teacher should take theory lecture, demonstration of concepts and prototype

MEANS OF ASSESSMENT

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

RECOMMENDED BOOKS

ATIRA

Websites for Reference:

<https://t.me/joinchat/tLfFhN-HBj4wMTZI> -TCP by S.B. Singh

AWP BY –Dr. V.A.SEHNAI

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	14	50
2	14	50
Total	28	100

THEORY	5.6.2 TECHNICAL TEXTILE & NON WOVEN	L	T	P
		2	-	-

COURSE OBJECTIVE

The objective of this course is to develop advanced knowledge of wet processing operations with emphasis on process control, quality management, and recent technological developments in textile processing. The course aims to familiarize students with quality control systems such as TQC, TQM, and Six Sigma, along with process control in preparatory, dyeing, printing, and finishing operations. It also focuses on eco-friendly processing technologies, sustainable chemicals, modern machinery, digital printing, energy conservation, and environmental standards to prepare students for efficient, sustainable, and quality-oriented textile wet processing industries.

COURSE OUTCOMES (CO):

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

Students will be able to

CO1 • Define and classify technical textiles, yarns, and fabric structures used, and relate their properties to specific application areas..

CO2 • Explain the manufacturing methods and performance characteristics of protective textiles including waterproof, antimicrobial, flame retardant, chemical-resistant, nuclear/biological-resistant, and mechanically resistant textiles.

CO3• Classify medical textiles and describe fibres, materials, and applications used in non-implantable, implantable, extra-corporeal, and healthcare hygiene products.

CO4 • Describe the structure, materials, and functional requirements of automotive and agro textiles, and evaluate their application-specific performance characteristics.

CO5 • Explain the classification, functions, manufacturing methods, and essential mechanical, hydraulic, and durability properties of geotextiles for civil and environmental engineering applications.

CO6 • Describe the classification and manufacturing processes of nonwovens including polymer-based and staple fibre-based technologies and bonding techniques, and relate them to application areas.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

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

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

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

COURSE CONTENTS

Unit -1: (3 Periods)

Definition, classification, products, Fibres used in technical textiles, yarns and fabric structures in technical textiles and their relevant properties. Fibres used for technical textile – their characteristics and application areas

Unit -2: Manufacture and properties of protective textiles- (5 Periods)

Water proof/coated and water repellent, antimicrobial, flame retardant, chemical resistance, Nuclear and biological resistance, mechanical resistance such as bullet proof, cut proof, stab proof

Unit -3: Medical textiles: (5 Periods)

Fibres used, classification of medical textiles- non-implantable material wound dressings, bandages, plasters, etc. Extra-corporal devices – Artificial kidney, liver lung, implantable material- suture, soft tissue implant, Orthopaedic implants, Cardiovascular implants, Healthcare/ hygiene products, medical cost, surgical gown, face mask etc.

Unit- 4: Automotive textiles: (5 Periods)

Types of cord, seat belt, air bag, seat upholstery, carpets, headliners, and helmets etc, Agro textile: Shade net, green house film, Mulch net, crop cover, anti-hail and bird protection net, finishing net etc.

Unit -5: Introduction of Geo textile: (5 Periods)

Classification of geo textiles, functions of geo textiles soil reinforcement, drainage (fluid transmission), filtration, separation, erosion control/absorption, objective of geo textiles, manufacturing of geo textile, essential properties of geo textiles- Mechanical determinants, Hydraulic determinants, durability determinants.

Unit -6: Nonwovens: (5 Periods)

Overview of Nonwovens, Definition of Nonwoven, Classification of Nonwoven. Steps of making nonwoven. ii) Polymer based Technology : Meltblown, Spunbond, SMS iii) Staple fibre based Technology: a) Formation of Web: Carding, Air laid, Randoweb, Wet laid b) Bonding Technique: Mechanical (needle punching, Stitch bonding), Thermal bonding, Chemical Bonding, Water jet Bonding (SPUNLACE), Application area of Nonwoven

INSTRUCTIONAL STRATEGY

Teacher should take theory lecture, demonstration of concepts and prototype

MEANS OF ASSESSMENT

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

RECOMMENDED BOOKS

1. Hand book on technical textile (Wood head publishing series in textile), A R Horrocks (Editor), Subhash C. Anand (Editor)
2. High performance technical textile by roshan Paul

3. Nonwoven Fabrics: Raw Materials, Manufacture, Applications, Characteristics, Testing Processes Edited by W. Albrecht, H. Fuchs, W. Kittelmann
4. Handook of Nonwoven Edited by S.J. Russell

Websites for Reference:

<https://nptel.ac.in/courses/116102057>

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	03	10
2	05	18
3	05	18
4	05	18
5	05	18
6	05	18
Total	28	100

AUDIT COURSE	5.7 INDIAN CONSTITUTION	L	T	P
		2	-	-

COURSE OBJECTIVES:

To provide a comprehensive understanding of the Indian Constitution's history and philosophy, and to familiarize them with the administrative structure, powers, and functions of the Union, State, and Local governments, along with the Judiciary and Election Commission.

COURSE OUTCOMES:

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

CO1: Explain the making of the Indian Constitution, interpret the Preamble, and discuss the significance of Fundamental Rights and Duties.

CO2: Describe the structure of the Union Executive, detailing the powers and roles of the President, Prime Minister, and Council of Ministers.

CO3: Distinguish between the functions of the Lok Sabha and Rajya Sabha and explain the jurisdiction and structure of the Supreme Court.

CO4: Discuss the administrative framework of State Governments, focusing on the roles of the Governor, Chief Minister, and State Secretariat.

CO5: Outline the hierarchy and functions of Local Administration, including District Administration, Municipal Corporations, and Zila Panchayats.

CO6: Examine the structure of the Election Commission of India and its critical role in conducting free and fair elections.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Engineering Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PSO2
CO1	-	-	-	-	3	1	3	*	*
CO2	-	-	-	-	2	2	2	*	*
CO3	-	-	-	-	3	1	2	*	*
CO4	-	-	-	-	2	2	2	*	*
CO5	-	-	-	-	3	2	2	*	*
CO6	-	-	-	-	3	1	2	*	*

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

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

COURSE CONTENT

Unit – I: The Constitution – Introduction (06 Periods)

The History of the Making of the Indian Constitution
Preamble and the Basic Structure, and its interpretation
Fundamental Rights and Duties and their interpretation

Unit – II: Union Government (06 Periods)

Structure of the Indian Union Government
President – Election, Role and Power
Prime Minister and Council of Ministers

Unit – III: Indian Legislature & Judiciary (06 Periods)

Composition of Lok Sabha and Rajya Sabha
Powers & Functions of Lok Sabha and Rajya Sabha
Structure of Supreme Court including Appointment of Judges
Powers & Functions of Supreme Court

Unit – IV: State Government (03 Periods)

Governor – Role and Power
Chief Minister and Council of Ministers
State Secretariat

Unit – V: Local Administration (04 Periods)

District Administration
Municipal Corporation
Zila Panchayat

Unit – VI: Election Commission (03 Periods)

Structure of Election Commission of India
Role and Function of Election Commission

INSTRUCTIONAL STRATEGY

Teach the Indian Constitution through interactive methods like case studies, debates, and role-plays to engage students. Use visuals and simplified texts to explain key features like fundamental rights and duties. Encourage discussions on amendments and landmark judgments. Incorporate quizzes and group projects to foster critical thinking and civic awareness

MEANS OF ASSESSMENT

- Class test/quizzes
- Home assignments
- Attendance
- Sessional Test

RECOMMENDED BOOKS:

1. Ethics and Politics of the Indian Constitution Rajeev Bhargava Oxford University Press, New Delhi, 2008
2. The Constitution of India B.L. Fadia Sahitya Bhawan; New edition (2017)
3. Introduction to the Constitution of India DD Basu Lexis Nexis; Twenty-Third 2018 edition
4. Our Constitution Subhash Chand Kashyap NBT New Delhi.

SUGGESTED SOFTWARE/LEARNING WEBSITES:

- 1.1. <https://www.constitution.org/cons/india/const.html>
- 1.2. <http://www.legislative.gov.in/constitution-of-india>
- 1.3. <https://www.sci.gov.in/constitution>
- 1.4. <https://www.toppr.com/guides/civics/the-indian-constitution/the-constitution-of-india/>
- 1.5. <https://ncert.nic.in/textbook.php>

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (periods)	Marks Allotted (%)
1	6	20
2	6	20
3	6	20
4	3	12
5	4	16
6	3	12
Total	28	100

PRACTICUM	6.1 TECHNOLOGY OF FINISHING	L	T	P
		4	-	-

COURSE OBJECTIVE

The course Technology of Finishing aims to develop a clear understanding of textile finishing processes used to improve fabric performance and appearance. It focuses on the classification and objectives of finishing, working principles of finishing machines and equipment, and application of chemical finishes such as crease-resistant, flame-retardant, water-repellent, and antimicrobial treatments. The course also covers specialized finishing of silk, wool, and synthetic fabrics including heat setting, antistatic, soil-release, and pilling control treatments, enabling students to select suitable finishing methods based on fibre type and end-use requirements.

COURSE OUTCOMES (CO):

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

Students will be able to

CO1 • Explain the objectives, importance, and classification of textile finishing processes.

CO2 • Describe the working principles of finishing machines and apply suitable chemical finishes including crease-resistant, water-repellent, flame-retardant, and antimicrobial treatments.

CO3 • Understand and explain the process and purpose of weighing of silk.

CO4 • Analyze finishing processes of woollen fabrics including decatizing, felting, shrinking, permanent setting, and rotary finishing.

CO5 • Explain finishing treatments for synthetic fabrics such as heat setting, antistatic finishing, soil-release treatment, and pilling control methods.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

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

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

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

COURSE CONTENTS

Unit – 1: INTRODUCTION AND CLASSIFICATION OF TEXTILE FINISHING.

(2 Periods)

Detail introduction and classification of textile finishing.

Unit – 2: FINISHING ACTIVITIES, INGRADIENTS & EQUIPMENTS: (32 Periods)

1. Starch preparation tanks, starching mangles, back filling machines and their working.
2. Principles and working of drying cylinders, stenters (clip and pin) hot flue and float drier.
3. Purpose of damping and damping machine.
4. Function of calendering, different types of calenders as plain, chasing, friction, schriener,
5. emboss and felt.
6. Purpose of raising and working of raising machine.
7. Principle and working of Sanforizing/Zero-Zero finishing
8. Rot, Mildew and Moth proofing agents and their application.
9. **Wash and Wear Finishes** - Crease resisting agents as Urea formaldehyde, Malamine formaldehyde, Di-methylol Ethylene Urea (DMEU), Di-methylol, Di-hydroxy ethylene urea(DMDHEU), Propylene Urea, Carbamates etc, their application to cellulosic materials,
10. catalysts and other additives used in antcrease finishing..
11. **Water Proof & Water-Repellent Finishes** -Application of Aluminum Soaps, Wax Emulsions, Reactive softeners and Silicone emulsions, their applications for water-proof and water-repellent finish.
12. **Flame Retardent Finishes** -Application of borax, boric acid, phosphoric acid urea, THPC (Tetra Kis Hydroxy Phosphonium Chloride), APO (AziridinyI Phosphonium Oxide) to cellulosic materials for flame-proofing.

Unit – 3: WEIGHING OF SILK:

(2 Periods)

Weighing of silk.

Unit – 4: FINISHING OF WOOLEN FABRICS:

(10 Periods)

1. Decatising, Permanent Setting, Felting of Wool
2. London shrinking
3. Principle and working of rotary Machine.

Unit – 5: FINISHING OF SYNTHETIC FIBRE FABRICS:

(10 Periods)

1. Heat setting mechanism of heat setting,
2. Antistatic finish, Agents used and their application.
3. Soil release, Finish-agents used and their application.
4. Pilling : Mechanism and methods for preventing pilling.

INSTRUCTIONAL STRATEGY

Teacher should take theory lecture, demonstration of concepts and prototype

MEANS OF ASSESSMENT

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

RECOMMENDED BOOKS

Technology of Finishing Volume 10 –V.A Shenai

Websites for Reference:

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

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	2	4
2	32	56
3	2	4
4	10	18
5	10	18
Total	56	100

(THEORY)	6.2 ENTREPRENEURSHIP AND START-UPS	L	T	P
		2	-	-

COURSE OBJECTIVES:

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

- Acquiring Entrepreneurial spirit and resourcefulness.
- Familiarization with various uses of human resources for earning dignified means of living.
- Understanding the concept and process of entrepreneurship - its contribution and role in the growth and development of individuals and the nation.
- Acquiring entrepreneurial quality, competence, and motivation.
- Learning the process and skills of creation and management of entrepreneurial ventures.

COURSE OUTCOMES:

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

CO1: Explain the concept of entrepreneurship, classify business structures, and distinguish between the roles of an entrepreneur, intrapreneur, and manager.

CO2: Identify feasible business ideas using activity maps and develop a preliminary Business Plan based on case study analysis.

CO3: Analyze market strategies using STP and SWOT analysis, and formulate the Vision, Mission, and Objectives for a start-up.

CO4: Discuss the fundamental functions of management, organizational structures, and the processes of recruitment, selection, and training.

CO5: Select appropriate financing methods (Govt schemes, Venture Capital) and apply Intellectual Property Rights (IPR) concepts to protect business ideas.

CO6: Describe the strategies for business succession, harvesting, and the legal types of dissolution.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Engineering Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PSO2
CO1	-	-	-	-	2	3	2	*	*
CO2	-	2	2	-	1	3	2	*	*
CO3	-	2	2	-	2	3	2	*	*
CO4	-	-	-	-	1	3	1	*	*
CO5	-	2	-	-	2	3	2	*	*
CO6	-	-	-	-	1	3	1	*	*

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

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

COURSE CONTENTS

Unit – I: INTRODUCTION TO ENTREPRENEURSHIP AND START-UPS (05 Periods)

Definitions, Classification of Entrepreneur

Traits of an Entrepreneur, Entrepreneurship, Motivation

Types of Business Structures- On the Basis of size and on the basis of ownership

Similarities/differences between entrepreneurs and managers

Unit – II: BUSINESS IDEAS AND THEIR IMPLEMENTATION (04 Periods)

Discovering ideas and visualizing the business

Activity map

Business Plan (Case Study)

Unit – III: IDEAS TO START-UP (08 Periods)

Marketing and Accounting- Definition and Importance.

Market Analysis – STP (Segmentation, Targeting, Positioning)

Competition evaluation and Strategy Development – Vision, Mission, Goal, Objectives.

Risk analysis- SWOT Analysis.

Unit – IV: MANAGEMENT (06 Periods)

Definition Concept and Functions of Management

Company's Organization Structure- Concept and Classification

Recruitment and Selection- Definition,

Training and Development- Importance.

Unit – V: FINANCING AND PROTECTION OF IDEAS (03 Periods)

Financing methods available for Entrepreneurship/ Start-ups in India (Government Scheme, Banking, NBFCs, SHG and Micro Financing).

Intellectual Property Rights- Overview of - Copyrights, Trademark, Geographical Indicators, Patenting and Licenses

Communication of Ideas to potential investors – Investor Pitch.

Unit – VI: SUCCESSION, DISSOLUTION AND HARVESTING STRATEGY (02 Periods)

Ways of succession

Types of Dissolution

INSTRUCTIONAL STRATEGY

Entrepreneurship and start-ups includes: use experiential learning, integrate real-world projects, provide mentorship, foster interdisciplinary collaboration, partner with businesses, invite industry professionals for lectures, organize business plan competitions, offer practical consulting opportunities, and help students launch real ventures to build entrepreneurial skills and mindsets.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests
- Mid-term and end-term written tests
- Model/Proto type making.

RECOMMENDED BOOKS:

1. The Startup Owner's Manual: The Step-by-Step Guide for Building a Great Company – Steve Blank and Bob Dorf, K & S Ranch, ISBN: 978-0984999392
2. Entrepreneurship Development (A New Venture Creation) – Vasant Desai, Himalaya Publishing House
3. Entrepreneurship Development – S.S. Khanka, S. Chand & Company Ltd., New Delhi
4. Entrepreneurship Development – Gupta and Srinivasan, S. Chand & Company Ltd., New Delhi
5. Demand: Creating What People Love Before They Know They Want It – Adrian J. Slywotzky with Karl Weber, Headline Book Publishing, ISBN: 978-0755388974
6. The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses – Eric Ries, Penguin UK, ISBN: 978-0670921607
7. The Innovator's Dilemma: The Revolutionary Book That Will Change the Way You Do Business – Clayton M. Christensen, Harvard Business Review Press, ISBN: 978-1422196021

SUGGESTED SOFTWARE/LEARNING WEBSITES:

1. <https://www.fundable.com/learn/resources/guides/startup>
2. <https://corporatefinanceinstitute.com/resources/knowledge/finance/corporate-structure/>
3. <https://www.finder.com/small-business-finance-tips>
4. <https://www.profitbooks.net/funding-options-to-raise-startup-capital-for-your-business/>
5. NPTEL Course on Entrepreneurship https://onlinecourses.nptel.ac.in/noc23_mg74/preview
6. National Geographic Channel you tube Video on “GI Tag Crafts of Bharat”

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (periods)	Marks Allotted (%)
1	05	15
2	04	15
3	08	25
4	06	20
5	03	10
6	02	15
Total	28	100

THEORY	6.4.1 DISASTER MANAGEMENT (OE-3)	L	T	P
		2	-	-

COURSE OBJECTIVE

Following are the objectives of this course:

- To learn about various types of natural and man-made disasters.
- To know pre- and post-disaster management for some of the disasters.
- To know about various information and organisations in disaster management in India.
- To get exposed to technological tools and their role in disaster management.

COURSE OUTCOMES (CO):

After completing this course, student will be:

CO1: Acquainted with fundamental concepts of disaster, hazard, vulnerability, risk, and capacity, and explain their inter-relationships.

CO2 : Classify various types of disasters (Geological, Hydro-meteorological, Biological, Man-made) and analyze their causes, trends, and consequences.

CO3 : Apply the Disaster Management Cycle (Pre, During, Post) and global frameworks (Hyogo, IDNDR) to plan for risk assessment and mitigation.

CO4 : Familiarised with institutional and legal mechanism of Disaster Management in India, including the DM Act 2005 and the role of various agencies.

CO5: Able to select scientific tools (GIS, RS, GPS) and engineering practices (structural/non-structural mitigation) for disaster preparedness and safe construction.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

CO No.	PO1 Basic and Discipline Specific Knowledge	PO2 Problem Analysis	PO3 Design/ Development of Solutions	PO4 Engineering Tools	PO5 Practices for Society, Sustainability and Environment	PO6 Project Management	PO7 Life Long Learning	PSO1	PS O2
CO1	2	-	-	-	3	-	1	*	*
CO2	3	2	-	-	3	-	2	*	*
CO3	1	2	1	-	3	2	2	*	*
CO4	2	-	-	-	3	1	2	*	*
CO5	3	2	1	2	3	2	2	*	*
CO6	3	-	3	3	-	-	2	*	*

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

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

COURSE CONTENTS

Unit – I: Understanding Disaster

(02 Periods)

Understanding the Concepts and definitions of Disaster, Hazard, Vulnerability, Risk, Capacity – Disaster and Development, and disaster management.

Unit – II: Types, Trends, Causes, Consequences and Control of Disasters

(05 Periods)

Geological Disasters (earthquakes, landslides, tsunami, mining); Hydro-Meteorological Disasters (floods, cyclones, lightning, thunder-storms, hail storms, avalanches, droughts, cold and heat waves) Biological Disasters (epidemics, pest attacks, forest fire); Technological Disasters (chemical, industrial, radiological, nuclear) and Manmade Disasters (building collapse, rural and urban fire, road and rail accidents, nuclear, radiological, chemicals and biological disasters) Global Disaster Trends – Emerging Risks of Disasters – Climate Change and Urban Disasters.

Unit - III: Disaster Management Cycle and Framework

(08 Periods)

Disaster Management Cycle – Paradigm Shift in Disaster Management. Pre-Disaster – Risk Assessment and Analysis, Risk Mapping, zonation and Microzonation, Prevention and Mitigation of Disasters, Early Warning System; Preparedness, Capacity Development; Awareness. During Disaster – Evacuation – Disaster Communication – Search and Rescue – Emergency Operation Centre – Incident Command System – Relief and Rehabilitation – Post-disaster – Damage and Needs Assessment, Restoration of Critical Infrastructure – Early Recovery – Reconstruction and Redevelopment; IDNDR, Yokohama Strategy, Hyogo Framework of Action.

Unit – IV: Disaster Management in India

(05 Periods)

Disaster Profile of India – Mega Disasters of India and Lessons Learnt. Disaster Management Act 2005 – Institutional and Financial Mechanism, National Policy on Disaster Management, National Guidelines and Plans on Disaster Management; Role of Government (local, state and national), Non-Government and Inter Governmental Agencies 457 Open Elective Courses

Unit – V: Applications of Science and Technology for Disaster Management

(08 Periods)

Geo-informatics in Disaster Management (RS, GIS, GPS and RS). Disaster Communication System (Early Warning and Its Dissemination). Land Use Planning and Development Regulations, Disaster Safe Designs and Constructions, Structural and Non-Structural Mitigation of Disasters S&T Institutions for Disaster Management in India

LIST OF RECOMMENDED BOOKS:

1. Publications of National Disaster Management Authority (NDMA) on Various Templates and Guidelines for Disaster Management.
2. Bhandani, R. K., An overview on natural & man-made disasters and their reduction, CSIR, New Delhi.
3. Srivastava, H. N., and Gupta G. D., Management of Natural Disasters in developing countries, Daya Publishers, Delhi.
4. Alexander, David, Natural Disasters, Kluwer Academic London.
5. Ghosh, G. K., Disaster Management, A P H Publishing Corporation.
6. Murthy, D. B. N., Disaster Management: Text & Case Studies, Deep & Deep Pvt. Ltd.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (periods)	Marks Allotted (%)
I	02	10
II	05	19
III	08	28
IV	05	19
V	08	24
Total	28	100

THEORY	6.4.2 ARTIFICIAL INTELLIGENCE (OE-3)	L	T	P
		2	-	-

COURSE OBJECTIVES

The objectives of this course are to:

- Introduce students to the fundamental concepts, goals, and applications of Artificial Intelligence.
- Enable understanding of intelligent agents and their interaction with different environments.
- Develop basic knowledge of search algorithms and problem-solving techniques used in AI.
- Familiarize students with fuzzy logic systems and their role in decision-making.
- Introduce neural network concepts and their applications in intelligent systems.

COURSE OUTCOMES (CO):

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

CO1: Explain the concept, goals, history, and applications of Artificial Intelligence.

CO2: Describe intelligent agents, their types, and properties of environments.

CO3: Apply basic search algorithms and heuristic techniques for problem solving.

CO4: Explain principles and components of fuzzy logic systems.

CO5: Describe the structure and working of neural networks including perceptron and back-propagation.

SUGGESTED COURSE ARTICULATION MATRIX (CAM):

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

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

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

COURSE CONTENT:

Unit 1 – Introduction to Artificial Intelligence

(06 Periods)

- Artificial Intelligence (AI) definition
- Goals of AI
- History of AI
- Applications of AI

Unit 2 – Agents and Environments (06 Periods)

- Agent Terminology, Types of Agents – Simple Reflex Agents, Model Based Reflex Agents, Goal Based Agents
- Nature of Environments, Properties of Environments

Unit 3 – Search Algorithms Terminology (06 Periods)

- Brute Force Search Strategies – Breadth First Search, Depth First Search.
- Heuristic Search Strategies, Local Search Algorithms.

Unit 4 – Fuzzy Logic Systems (05 Periods)

Introduction to Fuzzy Logic and Fuzzy systems,

- Membership functions,
- Fuzzification/Defuzzification

Unit 5 – Neural Networks (05 Periods)

Basic structure of Neural Networks

- Perceptron
- Back-propagation

RECOMMENDED BOOKS

Artificial Intelligence By Example: Develop machine intelligence from scratch using real artificial Intelligence use cases Denis Rothman Packt Publishing ISBN – 978-1788990547

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (periods)	Marks Allotted (%)
1	06	15
2	06	25
3	06	20
4	05	20
5	05	20
Total	28	100

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

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

i. 15 Marks for general behaviour and discipline

(by HODs in consultation with all the teachers of the department)

ii. 10 Marks for attendance as per following:

(by HODs in consultation with all the teachers of the department)

a) 75 - 80% 6 Marks

b) 80 - 85% 8 Marks

c) Above 85% 10 Marks

iii. * Even Semester:

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

a) State/National Level participation

b) Participation in two of above activities

c) Inter-Polytechnic level participation

**Odd Semester:

25 Marks maximum

a) Language Lab Practices / foreign language practices

b) Group Discussion and Personality Development

c) Industrial Visits/Industrial Talks

d) Power Point Presentations and Resume Making

e) Development of Aptitude and Reasoning Skills

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

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

b) Equipment Requirement:

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

TEXTILE TESTING

S.No	Name of Equipment	No.	@Rs.	Amt.in Rs.
1.	Baer Sorter (For Fibre Length) Acrylic Transparent Sheet - 6"X8"X2 pices, 3"X8"X2 pcs Fibre Mounting Templest 6"X8"X2 pices, 3"X8"X2 pcs with tweezers, velvet pad, scales, planchass with all complete accessories or Latest Configuration	2	20000	40000
2.	MicroscopeDigitalMocroscope - Microscope & Ends Counting Equipments-Magnifying Power 5X,10X,20X,40X,100X lenses Trinocular biological microscope with fibre cross section kit, high resolution CCD camera and imaging software with measurement facilities, Scope of use section of fibre or yarn, analysis of any fibre, yarn and fibre Range : 5X,10X,20X,450X,100X / as per requirements, Focus : Adjustable, Lights - White, Blue,Yellow, Upper & Lower, Supply -220 V AC supply Single Phase with all complete accessories Or Latest Configuration	2	65000	
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), The test length is automatically taken into account for calculation and final reading is displayed directly in TPM/TPL Range :Upto 60TPI Resolution :1 TPM or 0.01 TPI Motor Speed: Upto 1500 RPM Clamps : Spring loaded clamps at motor end for easy clamping of Yarn Averaging : Reading of at least 10 samples can be stored and average TPM/TPI value is calculated and digital display with pre set device. Supply : 220 V AC, single phase Suitable for S/Z type of twisted yarn with reset device. Tension weight upto 100 gm adjustable. Yarn spool mounting arrangement at one end of the twist tester with all complete accessories or Latest Configuration	2	28500	57000
13.	Fabric Strength Tester (Tensile Strength)	1	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.	Laundrometer (For washing fastness	1	50000	50000

	testing)			
18.	Crock Meter	1	10000	10000
19.	Digital Fibrograph Measuring Principle- Optical Measuring Range-12.0 to 45.0 mm Measuring Accuracy - +/- 0.1 mm Result Output-2.5% SL, 50% SL & UR % Front End Language-English Applicable Standard-ASTM D5332, ISO2648 & IS233 Power Supply-Single Phase 220V AC	1	320000	320000
20.	Uster Evenness Tester	1	2000000	2000000
21.	Trash Analyser	1	150000	150000
22.	Conditioning Oven 220 V With capability of maintaining temperature up to 100°C and facility for smooth variation of temperature inside 27 liter.	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 : 1Kg. (Stainless Steel), Angle measurement : On an Engraved circular scale graduated in 1 deg., Scale measurement : 0-180 with all complete accessories or Latest Configuration	2	15000	30000
25.	Water Repellancy Tester	1	80000	80000
26.	Pilling Tester	1	30000	30000
27.	Crimp Rigidity Tester Minor Load - 2 Gr. to 10Gr. in a step of one grams Major Load - 100 Gr. to 500 Gr. in step of 50 Grams Digital display 220 V, with all complete accessories or Latest Configuration	1	20000	20000
28.	Air Permeability Tester	1	35000	35000
29.	Sheffield Micronair (For Fibre Fineness)	1		
30.	Uster Stapler for fibre length	1		
31.	A.N. stapling apparatus for fibre fineness Tester	1		
32.	Miscellaneous Items-Thermometers, L.S. Heating Devices, Thermohydrograph, Whirling Hydrometer, Dry & Wet bulb thermometer, Physical Balance, etc.			
33.	Classmate (Yarn faults finding	1		900000

	equipments)			
33.	H.V.I. (High Volume Instrument) for various parameter of fibre	1		3500000
34.	Sublimation fastness tester	1		15000
35.	Round Sample of GSM with Electronic balance	1	35000	35000
36.	Stiffness Tester	1	15000	15000
37.	Drapemeter	1	25000	25000
38.	Fabric Thickness Tester	1	8000	8000
39.	A.S.T.M. Cards For Threads/Inch	1		

NOTE

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

PROCESS HOUSE

S.No.	Name of Equipment	No.	@ Rs.	Amt.in Rs.
1.	Lab Model of Jigger Machine	1	600000	600000
2.	Electronic weighing scale (min 0.01 gm to 300 gm)	1	7000	7000
3.	Dye Bath For Experimental Work	10	10000	100000
4.	Spray, Block and Screen Systems of Printing	10 Set	700	7000
5.	Spray Printing Machine With Compressor	1	150000	150000
6.	Lab Model of High Temperature Beaker Dyeing Machine	1	400000	400000
7.	Lab Model of Padding Mangle Machine.	1	400000	400000
8.	Electrically Operated Lab Stirrers			
	A. Fixed Type	1	7000	7000
9.	Colour Cabinet(Shade matching box)	1	40000	40000
10.	Stenter (Electrically heat setting and Curing Machine)	1	600000	600000
11.	Lab model of Infra Red beaker Dyeing Machine (Beaker -12/18)	1	500000	500000
12.	Wrap reel	1	20000	20000
13.	Lab Model of Winch Dyeing Machine(Open and Closed)	1	250000	75000
14.	HTHP Package Dyeing or Beam Dyeing Machine with compressor	1	600000	600000
15.	Induction Heater	1	4000	4000
16.	Hot Air Oven	1	250000	250000
17.	Vaccum Cleaner For Spray Printing	1	45000	45000
18.	Steam Ager	1	100000	100000
19.	Grey Scale	2set	50000	50000

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

9. EVALUATION SCHEME GUIDELINES: As Per AICTE ATTACHED (ANNEXURE- 2)

Theory Courses:

- Internal Assessment: 40%
- End Semester Examination: 60%
- Passing Criteria: A student must secure a minimum of 40% marks separately in both internal assessment and end semester examination to pass the course.

b. Practical Courses:

- Internal Assessment: 60%
- End Semester Examination: 40%
- Passing Criteria: A student must secure a minimum of 40% marks separately in both internal assessment and end semester examination to pass the course.

c. Summer Internship / Projects / Seminars, etc.:

- Evaluation is based on the following components:
 - Quality of work completed
 - Report preparation and documentation
 - Viva-voce performance
 - Presentation skills

Note:

Internal assessment is conducted based on the student's overall performance, which includes:

- Two best out of three mid-semester tests
- Quizzes and assignments
- Class participation and attendance
- Viva-voce and lab records (for practical subjects)

ANNEXURE- 2

EVALUATION METHODOLOGY

1. EVALUATION METHOD for THEORY

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

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

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

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

2. EVALUATION METHOD for PRACTICAL

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

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

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

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

SUGGESTED DISTRIBUTION OF MARKS FOR INTERNAL EVALUATION

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

SUGGESTED DISTRIBUTION OF MARKS FOR EXTERNAL EVALUATION

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

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

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

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

SUGGESTED DISTRIBUTION OF MARKS FOR INTERNAL EVALUATION

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

SUGGESTED DISTRIBUTION OF MARKS FOR EXTERNAL EVALUATION

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

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

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

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

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

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

SUGGESTED DISTRIBUTION OF MARKS FOR **INTERNAL** EVALUATION FOR IA4

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

12. LIST OF EXPERTS

Sr. No.	Name of Participants	Designation	Organization
1.	Sh. Brijesh Mishra	HoD Textile Chemistry	GP Dibai
2.	Smt. Anjali Patel	Lecturer Textile Chemistry	GP Kanpur
3.	Sh. R.K Shrivastav	Ret. Factory Manager	National Textile Corporation Bhopal
4.	Sh. Vijay Pratap Singh	Ret. Senior Executive	Elgin Mill Ltd.
5.	Sh. Rahul Kumar Shringirishi	Guest Lecturer Textile Chemistry	G.P. Kanpur

(ANNEXURE-I)

PROCEDURES / FORMATS FOR ORGANIZING INTERNSHIPS.

STUDENT INTERNSHIP PROGRAM APPLICATION

Complete and submit to the TPO/ Internship Program Coordinator.

1. Student Name:		Enroll. No.:	
2. Campus Address:		Phone:	
3. Home Address:		Phone:	
4. Student email address:			
5. Branch:		6. Internship Semester: _____	
7. Internship Preferences			
	Company/Industry	Core Area	Location
Preference-1			
Preference-2			
Preference-3			
Faculty mentor Signature: _____ Date _____.			
Student Signature: _____ Date _____.			
Signature confirms that the student agrees to the terms, conditions, and requirements of the Internship Program			

Signature with seal
HOD/Principal

(ANNEXURE-I)

REQUEST LETTER FROM INSTITUTE TO INTERNSHIP/INDUSTRIAL TRAINING PROVIDER

Ref. No.: _____

Date: _____

To,
The HR Manager/Training Coordinator

.....
.....

Subject: Request for Internship/Industrial Training for Diploma Students

Sir/Madam,

We are pleased to introduce....., a premier institution affiliated with Board of Technical Education, Uttar Pradesh, offering diploma programs in various diploma disciplines.

As a part of the curriculum, our students are required to undergo Internship/Industrial Training to gain practical exposure and enhance their technical competencies. Therefore, we kindly request your esteemed organization to provide Internship/Training opportunities to our students during the period from to

S. No.	Name	Enroll. No.	Semester/Year	Discipline

Yours sincerely,

(Head of Department/Principal)

(ANNEXURE-II)

PROFORMA FOR EVALUATION OF INTERNSHIP BY INDUSTRY

Student Name:Evaluation Date:

Industry Supervisor Name:

Company/Organization:

Title of the

Project:

Please evaluate your intern by indicating the frequency with which you observed the following behaviors:

Parameters	Max. Marks	Marks Given
Attendance and Punctuality	20	
Discipline and Professional Behavior	20	
Technical Knowledge and Understanding of Processes	30	
Practical Skills and Quality of Work	20	
Ability to Apply Theoretical Knowledge	20	
Problem Solving and Analytical Ability	10	
Communication and Interpersonal Skills	20	
Teamwork and Collaboration	10	
Internship Report/Documentation	20	
Presentation and Viva-Voce	30	
Total Marks	200	

Additional comments, if any:

Signature with seal of Industry supervisor

HR Manager

INTERNSHIP REPORT

STUDENT'S DIARY/ DAILY LOG

The main purpose of writing daily diary is to cultivate the habit of documenting and to encourage the students to search for details. It develops the students' thought process and reasoning abilities. The students should record in the daily training diary the day to day account of the observations, impressions, information gathered and suggestions given, if any. It should contain the sketches & drawings related to the observations made by the students.

The daily training diary should be signed after every day by the supervisor/ in charge of the section where the student has been working. The diary should also be shown to the Faculty Mentor visiting the industry from time to time and got ratified on the day of his visit.

Student's Diary and Internship Report should be submitted by the students along with attendance record and an evaluation sheet duly signed and stamped by the industry to the Institute immediately after the completion of the training. It will be evaluated on the basis of the following criteria:

- Regularity in maintenance of the diary.
- Adequacy & quality of information recorded.
- Drawings, sketches and data recorded.
- Thought process and recording techniques used.
- Organization of the information.

INTERNSHIP REPORT

After completion of Internship, the student should prepare a comprehensive report to indicate what he has observed and learnt in the training period. The student may contact Industrial Supervisor/ Faculty Mentor/TPO for assigning special topics and problems and should prepare the final report on the assigned topics. Daily diary will also help to a great extent in writing the industrial report since much of the information has already been incorporated by the student into the daily diary. The training report should be signed by the Internship Supervisor, TPO and Faculty Mentor. The Internship report will be evaluated on the basis of following criteria:

- i. Originality.
- ii. Adequacy and purposeful write-up.
- iii. Organization, format, drawings, sketches, style, language etc.
- iv. Variety and relevance of learning experience.
- v. Practical applications, relationships with basic theory and concepts taught in the course.

MONITORING & EVALUATION OF INTERNSHIP

The industrial training of the students will be evaluated in three stages:

1. Evaluation by Industry.
2. Evaluation by faculty supervisor of Industry.
3. Evaluation through seminar presentation/viva-voce at the Institute.

1. EVALUATION BY INDUSTRY

The industry will evaluate the students based on the Punctuality, eagerness to learn, Maintenance of Daily Diary and skill test in addition to any remarks.

2. MONITORING/ SURPRISE VISIT BY TPO/ STAFF/ FACULTY MENTOR

TPO/Staff/ Faculty Mentor of the institutes will make a surprise visit to the internship site, to check the student's presence physically, if the student is found absent without prior intimation to the T & P Cell, entire training will be cancelled. Students should inform the TPO, faculty mentor as well as the industry supervisor at least one day prior to availing leave by email. Students are eligible to avail 1-day leave in 4 weeks and 2 days leave in 6 weeks of the internship period apart from holidays and weekly offs.

3. EVALUATION THROUGH SEMINAR PRESENTATION/VIVA-VOCE AT THE INSTITUTE

The student will give a seminar based on his training report, before an expert committee constituted by the concerned department as per norms of the institute. The evaluation will be based on the following criteria:

- Quality of content presented.
- Proper planning for presentation.
- Effectiveness of presentation.
- Depth of knowledge and skills.
- Attendance record, daily diary, departmental reports shall also be analyzed along with the Internship Report.

Seminar presentation will enable sharing knowledge & experience amongst students & teachers and build communication skills and confidence in students.