COMPETENCY BASED CURRICULUM

DIPLOMA
IN
TEXTILE TECHNOLOGY

(Duration 03 Years)
NSQF Level – 5

Under
Haryana State Board of Technical Education

Developed By

Curriculum Development Center

National Institute of Technical Teachers Training & Research

(Ministry of Education, Government of India)

Sector - 26, Chandigarh, UT, India.

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PREFACE

Learning and learning experience are the foundation of any education system. Appropriateness of education and its useful implications stand on the platform of knowledge and skill. But the knowledge and skill cannot be quantified qualitatively without ensuring learning experience. Curriculum is the pathway to select and organise learning experience. It helps the teachers to provide tangible resources, goals and objectives to learners. Curriculum acts as a catalyst to stimulate creativity, innovation, ethics, values, responsibility and many human factors. Curriculum embodies rigour and high standards and creates coherence to empower learner to meet the industrial and societal needs. Curriculum is a central guide for a teacher to plan a standard based sequence for the instructional delivery.

The industrial revolution 4.0 has forced the technical education system to reinvent the curriculum to meet the human resource requirement of the industry. The data driven systems relying on the subjects like machine-learning, Artificial Intelligence, Data Science etc are literally forcing the technical education system to offer different subjects differently to address the emerging challenges. The non-linear way of learning now facilitates students to choose path of knowledge to skill or vice-versa. The bi-directional process requires innovative curriculum design and revision. Diploma programme is now more challenging than ever. The level of skill and knowledge demanded by industry from diploma holders are highly interdisciplinary at the same time address special need. Hence, there is a need to align the curriculum to National Skill Qualification Framework (NSQF).

National Education Policy, NEP-2020 has now opened up diversities for the education system to explore and exploit to make the education relevant. The policy emphasises to inculcate value, ethics, respect to culture and society etc along with industry ready knowledge and skill among the students. The interdisciplinary nature of curriculum, academic bank of credits and integration of technology in teaching-learning envisaged in NEP-2020 make it more challenging for curriculum development. NITTTR, Chandigarh has developed the art of curriculum development over 54 years of its existence. The expertise and experience available in the institute follow time-tested and acclaimed scientific methods to design/revise curriculum. The experienced faculty members entrusted with the curriculum development or revision activities are well-versed with NSQF, NEP and Outcome based education. I am happy to note that **Haryana State Board of Technical Education, Panchkula, Haryana** reposed their confidence on this expertise to develop **AICTE/NSQF/NEP 2020** aligned curriculum for the state. This documented curriculum is an outcome of meticulous planning and discussions among renowned experts of the subject through series of workshops. The effective implementation of this curriculum supported with quality instructional resources will go a long way in infusing the learning experience among learners to make them industry ready.

Director

National Institute of Technical Teachers Training & Research, Chandigarh

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i) Principal Secretary Technical Education-cum-Chairman, Haryana State Board of Technical Education, Panchkula, Haryana for initiating this project on designing of AICTE/NSQF/NEP 2020 aligned curriculum.

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Professor & Head
Curriculum Development Center
National Institute of Technical Teachers Training & Research, Chandigarh

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1. SALIENT FEATURES

1.	Name	:	**Diploma in Textile Technology**
2.	Duration	:	**03 Years**
3.	Hours per week	:	**35**
4.	Entry Qualification	:	**10th Pass**
5.	Student Intake	:	**As per sanctioned strength**
6.	Pattern	:	**Semester**
7.	Scheme	:	**Multi Point Entry and Exit**
8.	NSQF Level	:	**5**
9.	Theory Practical Ratio	:	**36 : 64**
10.	Project Work	:	**Minor and Major Project**
11.	In-house/Industrial Training	:	**Mandatory after First and Second Year**

2. NSQF COMPLIANCE

National Skill Qualification Framework has defined total Ten Levels. Each level of the NSQF is associated with a set of descriptors made up of five outcome statements, which describe in general terms, the minimum knowledge, skills and attributes that a learner needs to acquire in order to be certified for that level.

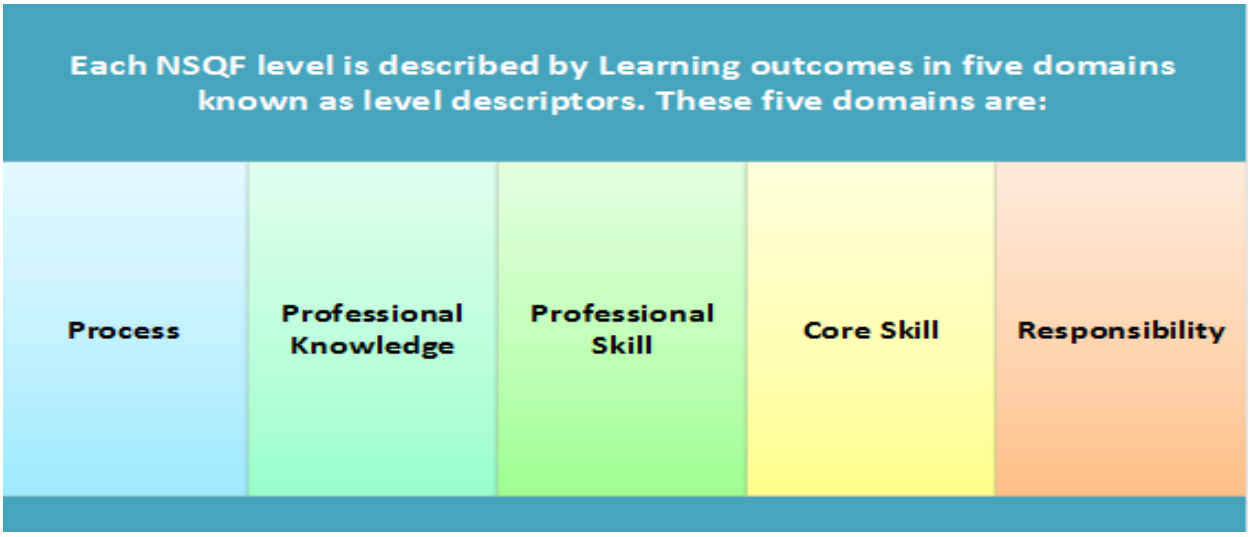

Fig1: NSQF Domains

NSQF LEVEL - 3 COMPLIANCE

The NSQF level - 3 descriptor is as follows:

Process	• Person may carry out a job which may require limited range of activities routine and predictable.
Professional Knowledge	• Basic facts, process and principle applied in trade of employment.
Professional Skill	• Recall and demonstrate practical skill, routine and repetitive in narrow range of application.
Core Skill	• Communication written and oral, with minimum required clarity, skill of basic arithmetic and algebraic principles, personal banking, basic understanding of social and natural environment.
Responsibility	• Under close supervision. Some responsibility for own work within defined limit.

Fig 2: NSQF Level – 3 Descriptor

Work requiring knowledge, skills and aptitudes at level 3 will be routine and predictable. Job holders will be responsible for carrying out a limited range of jobs under close supervision. Their work may require the completion of a number of related tasks. People carrying out these job roles may be described as “Semi skilled workers”. Individuals in jobs which require level 3 qualifications will normally be expected to be able to communicate clearly in speech and writing and may be required to use arithmetic and algebraic processes. They will be expected to have previous knowledge and skills in the occupation and should know the basic facts, processes and principles applied in the trade for which they are qualified and be able to apply the basic skills of the trade to a limited range of straightforward jobs in the occupation.

They will be expected to understand what constitutes quality in their job role and more widely in the sector or sub-sector and to distinguish between good and bad quality in the context of the jobs they are given. Job holders at this level will be expected to carry out the jobs they are given safely and securely. They will work hygienically and in ways which show an understanding of environmental issues. This means that they will be expected to take responsibility for their own health and safety and that of fellow workers and, where appropriate, customers and/or clients. In working with others, they will be expected to conduct themselves in ways which show a basic understanding of the social environment. They should be able to make a good contribution to team work.

NSQF LEVEL - 4 COMPLIANCE

The NSQF level-4 descriptor is given below:

Process	• Work in familiar, predictable, routine, situation of clear choice
Professional Knowledge	• Factual knowledge of field of knowledge or study.
Professional Skill	• Recall and demonstrate practical skill, routine and repetitive in narrow range of application, using appropriate rule and tool, using quality concepts.
Core Skill	• Communication written and oral, with required clarity, skill of basic arithmetic and algebraic principles, personal banking, basic understanding of social and natural environment.
Responsibility	• Responsibility for own work and learning.

Fig 3: NSQF Level – 4 Descriptor

Work requiring knowledge, skills and aptitudes at level 4 will be carried out in familiar, predictable and routine situations. Job holders will be responsible for carrying out a range of jobs, some of which will require them to make choices about the approaches they adopt. They will be expected to learn and improve their practice on the job. People carrying out these jobs may be described as "skilled workers". Individuals in jobs which require level 4 qualifications should be able to communicate clearly in speech and writing and may be required to use arithmetic and algebraic processes. They will be expected to have previous knowledge and skills in the occupation in which they are employed, to appreciate the nature of the occupation and to understand and apply the rules which govern good practice. They will be able to make choices about the best way to carry out routine jobs where the choices are clear.

They will be expected to understand what constitutes quality in the occupation and will distinguish between good and bad quality in the context of their job roles. Job holders at this level will be expected to carry out their work safely and securely and take full account of the health and safety on colleagues and customers. They will work hygienically and in ways which show an understanding of environmental issues. In working with others, they will be expected to conduct themselves in ways which show a basic understanding of the social and political environment. They should be able to guide or lead teams on work within their capability.

NSQF LEVEL - 5 COMPLIANCE

The NSQF level-5 description is given below:

Process	• Job that requires well developed skill, with clear choice of procedures in familiar context.
Professional Knowledge	• Knowledge of facts, principles, processes and general concepts, in a field of work or study.
Professional Skill	• A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information.
Core Skill	• Desired mathematical skill; understanding of social, political; and some skill of collecting and organising information, communication.
Responsibility	• Responsibility for own work and learning and some responsibility for others' works and learning

Fig 4: NSQF Level – 5 Descriptor

Work requiring knowledge, skills and aptitudes at level 5 will also be carried out in familiar situations, but also ones where problems may arise. Job holders will be able to make choices about the best procedures to adopt to address problems where the choices are clear. Individuals in jobs which require level 5 qualifications will normally be responsible for the completion of their own work and expected to learn and improve their performance on the job. They will require well developed practical and cognitive skills to complete their work. They may also have some responsibility for others' work and learning. People carrying out these jobs may be described as "fully skilled workers" or "supervisors".

Individuals employed to carry out these jobs will be expected to be able to communicate clearly in speech and writing and may be required to apply mathematical processes. They should also be able to collect and organise information to communicate about the work. They will solve problems by selecting and applying methods, tools, materials and information. They will be expected to have previous knowledge and skills in the occupation, and to know and apply facts, principles, processes and general concepts in the occupation. They will be expected to understand what constitutes quality in the occupation and will distinguish between good and bad quality in the context of their work. They will be expected to operate hygienically and in ways which show an understanding of environmental issues. They will take account of health and safety issues as they affect the work they carry out or supervise.

In working with others, they will be expected to conduct themselves in ways which show an understanding of the social and political environment.

3. NATIONAL EDUCATION POLICY (NEP) - 2020

NEP 2020 aims at a comprehensive holistic education to develop all capacities of human beings - intellectual, aesthetic, social, physical, emotional, and moral - in an integrated manner. A holistic arts education will help develop well-rounded individuals that possess: critical 21st century capacities in fields across the arts, humanities, languages, sciences, social sciences, and professional, technical, and vocational fields; an ethic of social engagement; soft skills, such as communication, discussion and debate; and rigorous specialization in a chosen field or fields. Such a holistic education shall be, in the long term, the approach of all undergraduate programmes, including those in professional, technical, and vocational disciplines.

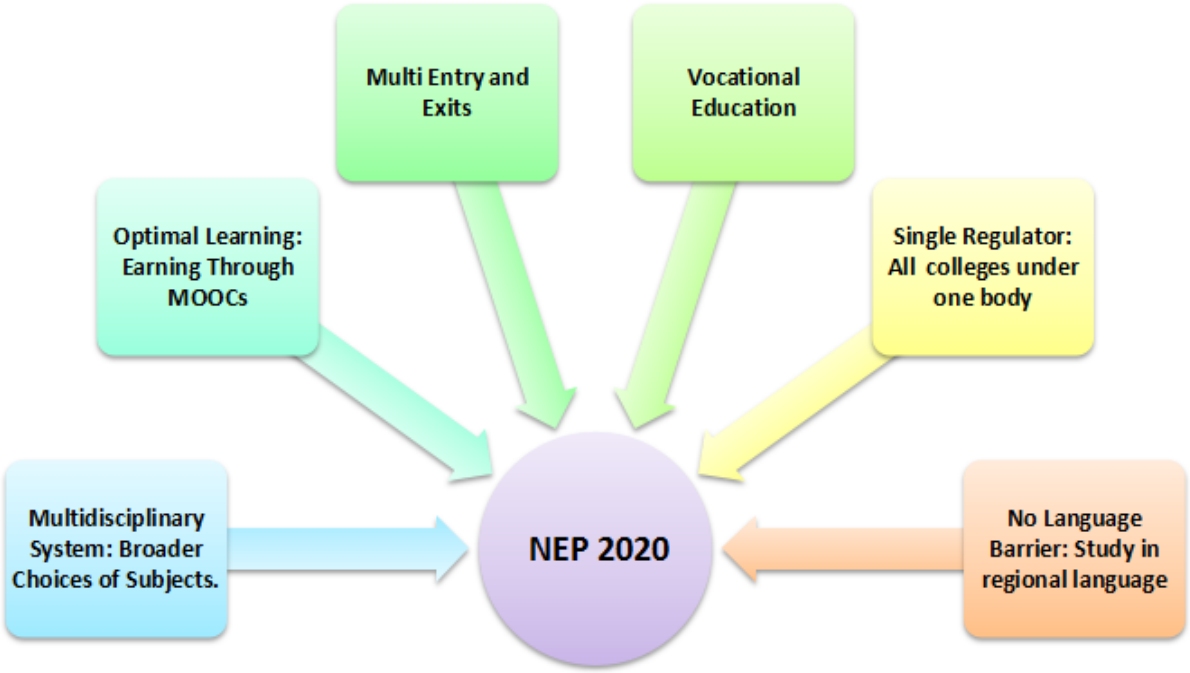

Fig 5: NEP 2020

Flexibility in curriculum and novel and engaging course options will be on offer to students, in addition to rigorous specialisation in a subject or subjects. Pedagogy for courses will strive for significantly less rote learning and an increased emphasis on communication, discussion, debate, research, and opportunities for cross-disciplinary and interdisciplinary thinking. The flexible and innovative curriculum shall emphasize on offering credit-based courses and projects in the areas of community engagement and service, environmental education and value-based education. as part of a holistic education, students will be provided with opportunities for internships with local industry, businesses, artists, crafts persons, villages and local communities, etc., as well as

research internships with faculty and researchers at their own or other HEIs or research institutions, so that students may actively engage with the practical side of their learning and, as a by-product, further improve their employability.

Effective learning requires relevant curriculum, engaging pedagogy, continuous formative assessment and adequate student support. The curriculum must be updated regularly aligning with the latest knowledge requirements and shall meet specified learning outcomes. High-quality pedagogy is then necessary to successfully impart the curricular material to students; pedagogical practices determine the learning experiences that are provided to students - thus directly influencing learning outcomes. The assessment methods have to be scientific and test the application of knowledge. Higher Education Institutes should move to a criterion-based grading system that assesses student achievement based on the learning goals for each programme, making the system fairer and outcomes more comparable. HEIs should also move away from high-stakes examinations towards more continuous and comprehensive evaluation.

4. DIPLOMA PROGRAMME OUTCOMES

The programme outcomes are derived from five domains of NSQF Level namely Process, Professional Knowledge, Professional Skill, Core Skill, Responsibility. After completing this programme, the student will be able to:

PO1: Perform tasks in limited range of activities, familiar situation with clear choice of procedures.

PO2: Acquire knowledge of principles and processes in the field of Textile Technology.

PO3: Develop skills to accomplish quality tasks and solve problems using methods, tools, materials and information**.**

PO4: Demonstrate skill of communication, collecting and organizing information along with knowledge of social, political and natural environment.

PO5: Take the responsibility of own works and supervises others work.

PO6: Select multidisciplinary and open subjects of own interest and perform self learning through Massive Open Online Courses.

5. DERIVING CURRICULUM AREAS FROM DIPLOMA PROGRAMME OUTCOMES

The following curriculum areas have been derived from Programme outcomes:

Sr. No.	Programme Outcomes	Curriculum Subjects / Areas
1.	Perform tasks in limited range of activities, familiar situation with clear choice of procedures.	• Applied Physics • Applied Chemistry • Textile Fibers • Sewing and Indian Textile Illustrations • Weaving Preparatory Processes • Introduction to Textile Processes • Fabric Structure • Dyeing and Pre-treatments • Spinning Technology - I • Weaving Technology - I • Knitting Technology • Textile Printing and Finishing • Spinning Technology-II • Weaving Technology-II • Textile Testing – I • Spinning Technology - III • Advanced Fabric Manufacturing • Garment Manufacturing Technology • Textile Testing - II • Program Elective – I • Computer Applications in Textile Technology
2.	Acquire knowledge of principles and processes in the field of Textile Technology.	• Spinning Technology - I • Weaving Technology - I • Knitting Technology • Textile Printing and Finishing • Spinning Technology-II • Weaving Technology-II • Textile Testing – I • Spinning Technology - III • Advanced Fabric Manufacturing • Garment Manufacturing Technology • Program Elective - I

		• Program Elective - II
3.	Develop skills to accomplish quality tasks and solve problems using methods, tools, materials and information**.**	• Spinning Technology - I • Weaving Technology - I • Knitting Technology • Textile Printing and Finishing • Spinning Technology-II • Weaving Technology-II • Textile Testing – I • Spinning Technology - III • Advanced Fabric Manufacturing • Garment Manufacturing Technology • Program Elective – I • Computer Applications in Textile Technology
4.	Demonstrate skill of communication, collecting and organizing information along with knowledge of social, political and natural environment.	• English and Communication Skills - I • Applied Mathematics - I • Fundamentals of IT • Applied Mathematics - II • Environmental Studies & Disaster Management • Industrial/In-House Training – I • English and Communication Skills – II • Minor Project • Industrial Training – II • Entrepreneurship Development & Management • Industrial Training / Major Project
5.	Take the responsibility of own works and supervises others work.	• Industrial/In-House Training – I • Minor Project • Industrial Training – II • Industrial Training / Major Project
6.	Select multidisciplinary and open subjects of own interest and perform self learning through Massive Open Online Courses.	• Multidisciplinary Elective • Open Elective

FIRST YEAR

NSQF LEVEL - 3

6. STUDY CUM EVALUATION SCHEME (FIRST YEAR)

FIRST SEMESTER

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week		Credits (C) (L + P = C)	MARKS IN EVALUATION SCHEME						Total Marks of Internal & External
					INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	P		Th	Pr	Total	Th	Pr	Total	
1.1	*English &Communication Skills– I	2	2	2 + 1 = 3	40	40	80	60	60	120	200
1.2	**Applied Mathematics - I	4	-	4 + 0 = 4	40	-	40	60	-	60	100
1.3	**Applied Physics	2	2	2 + 1 = 3	40	40	80	60	60	120	200
1.4	*Applied Chemistry	3	2	3 + 1 = 4	40	40	80	60	60	120	200
1.5	Textile Fibers	2	4	2 + 2 = 4	40	40	80	60	60	120	200
1.6	Sewing and Indian Textile Illustrations	-	6	0 + 3 = 3	-	40	40	-	60	60	100
1.7	*Environmental Studies & Disaster Management	2	-	2 + 0 = 2	40	-	40	60	-	60	100
# Student Centered Activities(SCA)		-	4	-	-	-	-	-	-	-	-
Total		**15**	**20**	**23**	**240**	**200**	**440**	**360**	**300**	**660**	**1100**

* Common with other Diploma Courses.

** Same as Applied Mathematics-I and Applied Physics-I. Also common with other Diploma Courses.

Student Centered Activities will comprise of co-curricular activities like extension lectures on Constitution of India, Games, Yoga, Human Ethics, Knowledge of Indian System, Hobby clubs e.g. Photography etc., Seminars, Declamation contests, Educational field visits, N.C.C., NSS, Cultural Activities and self study etc.

SECOND SEMESTER

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week		Credits (C) (L + P = C)	MARKS IN EVALUATION SCHEME						Total Marks of Internal & External
					INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	P		Th	Pr	Total	Th	Pr	Total	
2.1	Weaving Preparatory Processes	3	2	3 + 1 = 4	40	40	80	60	60	120	200
2.2	**Introduction to Textile Processes	3	4	3 + 2 = 5	40	40	80	60	60	120	200
2.3	Fabric Structure	3	4	3 + 2 = 5	40	40	80	60	60	120	200
2.4	Dyeing and Pre-treatments	3	4	3 + 2 = 5	40	40	80	60	60	120	200
2.5	*Fundamentals of IT	2	4	2 + 2 = 4	40	40	80	60	60	120	200
# Student Centered Activities (SCA)		-	3	-	-	-	-	-	-	-	-
Total		**14**	**21**	**23**	**200**	**200**	**400**	**300**	**300**	**600**	**1000**

* Common with other Diploma Courses

** Common with Textile Processing

Student Centered Activities will comprise of co-curricular activities like extension lectures on Constitution of India Games, Yoga, Human Ethics, Knowledge of Indian System, Hobby clubs e.g. Photography etc., Seminars, Declamation contests, Educational field visits, N.C.C., NSS, Cultural Activities and self study etc.

Summer Industrial/In-house Training: After 2nd semester, students shall undergo Summer Training of minimum 4 Weeks.

7. HORIZONTAL AND VERTICAL SUBJECTS ORGANISATION

Sr. No.	Subjects	Hours Per Week	
		First Semester	Second Semester
1.	English & Communication Skills – I	4	-
2.	Applied Mathematics - I	4	-
3.	Applied Physics	4	-
4.	Applied Chemistry	5	
5.	Textile Fibers	6	-
6.	Sewing and Indian Textile Illustrations	6	-
7.	Environmental Studies & Disaster Management	2	
8.	Weaving Preparatory Processes	-	5
9.	Introduction to Textile Processes	-	7
10.	Fabric Structure	-	7
11.	Dyeing and Pre-treatments	-	7
12.	Fundamentals of IT	-	6
13.	Student Centered Activities	4	3
	Total	**35**	**35**

8. COMPETENCY PROFILE & EMPLOYMENT OPPORTUNITIES

In government and private sectors related to **Textile Technology**, **"Semi Skilled workers"** are required to carry out a limited range of predictable tasks under close supervision. They are expected to communicate in written or oral with required clarity along with basic understanding of mathematics, social and natural environment. They should know the basic facts, limited processes and principles relevant to Textile Technology.

Textile Technology students after NSQF – Level 3 should know about the production of fibres. They are also expected to have knowledge of the fibre morphology, structure, properties and end use of different fibres. Textile Technology students shall have practical hands on experience in various type of art making and its appreciations. The exposure of various basic methods of science behind designs and placement of designs is essential. They should be able to stitch woven fabric.

Textile Technology students are expected to have efficiency in selection of suitable yarns and the preparation of yarn for weaving. They should have good exposure of weaving preparatory processes like Winding, Warping, Sizing and Drawing-in. Basic knowledge of textile processes is very important for students. Textile Technology students should be able to uses the textile processes to check the requirement of yarn accordingly. They have to perform tasks relating to yarn requirement, design and complete order as per sample. They should be able to calculate weight of warp and weft required, weight of fabric with different dimension. They should have requisite knowledge and skill about various processing of textile machineries used to convert grey fabric into dyed fabric.

They are expected to recall and demonstrate practical routine and repetitive skills, in narrow range of Textile Technology applications. They have wide scope to work in textile mills, processing houses, garment export houses, weaving mills, textile testing houses, fabric quality control centers and production units in garment manufacturing industries. They can start their own small start ups in the area of marketing, sales, manufacturing and production etc.

9. PROGRAMME OUTCOMES

The programme outcomes are derived from five domains of NSQF Level – 3 namely Process, Professional Knowledge, Professional Skill, Core Skill, Responsibility. After completing this level, the student will be able to:

PO1: Carry out a task which may require limited range of predictable activities.

PO2: Acquire knowledge of Basic facts, process and principles related to textile technology for wage and self employment.

PO3: Demonstrate practical skill in narrow range of textile technology related applications.

PO4: Communicate in written and oral, with minimum required clarity along with basic understanding of mathematics, social and natural environment.

PO5: Perform task under close supervision with some responsibility for own work within defined limit.

10. ASSESSMENT OF PROGRAMME AND COURSE OUTCOMES

Programme Outcomes to be assessed	Assessment criteria for the Course Outcomes
PO1: Carry out a task which may require limited range of predictable activities.	• Identify physical quantities, select their units and make measurements with accuracy. • Represent physical quantities as scalar and vector and identify type of motions, various forms of energy, their conversion and applications. • Elaborate scientific work, energy and power, forms of friction and solve problems related to them. • Comprehend properties of matter and effect of temperature on various matter and phenomenon. • Demonstrate the use of physical principles and analysis in various technical fields. • Classify the elements into metals, non-metals and metalloids. • Explain the extraction of metals from ores, their mechanical properties and modification of properties by alloy formation. • Classify fuels and lubricants and apply them in different engineering applications. • Identify the polymeric materials, assess their properties and design suitable polymeric materials for current and future applications. • Apply effective methods for corrosion prevention • Identify different manmade fibres. • Predict the end uses of various textile fibres. • Sketch natural designs. • Draw abstract designs. • Realize Indian traditional textile. • Sketch folk art. • Learn machine used for garment manufacturing. • Calculate the quantity of warp and weft yarn to

	weave a definite length of fabric. • Distinguish various methods of knitting. • Calculate weight of yarn in different numbering systems. • Identify and draw repeat, draft, peg plan and sectional view. • Compare and draw design from draft and peg plan and vice versa. • Sketch diamond, honeycomb and spot figuring design. • Calculate weight of warp, weft per square and linear yard, per square and linear meter. • Check warp, weft and fabric cover. • Carry out dyeing of polyester.
PO2: Acquire knowledge of Basic facts, process and principles related to textile technology for wage and self employment.	• Identify physical quantities, select their units for use in engineering solutions, and make measurements with accuracy. • Represent physical quantities as scalar and vector and identify type of motions, various forms of energy and power, their conversion and applications. • List different industrial applications of 'Electrolysis'. • Classify different natural fibres. • List the properties of natural fibres. • Learn about the manufacturing process of manmade fibres. • Summarize the properties of manmade fibres. • Classify various processes of weaving preparatory. • Summarize different methods/ machines of winding, warping, sizing. • Study the constructional details and the latest developments in these machines. • Acquire the knowledge of various sizing ingredients. • Classify various processes for making of yarn.

	• Learn how a woven fabric is made and its preparatory processes. • Differentiate between woven and knitted garments. • Learn the basic weaves i.e. plain weave, twill weave, satin/ sateen weave and their derivatives. • Study about various textile wet treatments, singeing, desizing, scouring • Learn about scouring, bleaching and mercerization. • Summarize dyeing, various terms and cotton dyeing. • Describe about wool, silk and acrylic dyeing.
PO3: Demonstrate practical skill in narrow range of textile technology related applications.	• Comprehend heat and temperature scales and measurements and their modes of transfer. • Identify different manmade fibres. • Predict the end uses of various textile fibres. • Sketch natural designs. • Draw abstract designs. • Realize Indian traditional textile. • Sketch folk art. • Learn machine used for garment manufacturing. • Calculate the quantity of warp and weft yarn to weave a definite length of fabric. • Distinguish various methods of knitting. • Calculate weight of yarn in different numbering systems. • Identify and draw repeat, draft, peg plan and sectional view. • Compare and draw design from draft and peg plan and vice versa. • Sketch diamond, honeycomb and spot figuring design. • Calculate weight of warp, weft per square and linear yard, per square and linear meter. • Check warp, weft and fabric cover. • Carry out dyeing of polyester.

PO4: Communicate in written and oral, with minimum required clarity along with basic understanding of social and natural environment.	• Identify the nuances of Communication, both Oral and Written. • Acquire knowledge of the meaning of communication, communication process and speaking skills. • Acquire enhanced vocabulary and in-depth understanding of Grammatical Structures and their usage in the communication. • Communicate effectively with an increased confidence to read, write and speak in English language fluently. • Understand the geometric shapes used in engineering problems by Co-ordinate Geometry and Trigonometry. • Formulate engineering problems into mathematical formats with the use matrices, co-ordinate geometry and trigonometry • Calculate the approximate value of roots of certain expressions in engineering problems by application of binomial theorem. • Explore the idea of location, graph, and linear relationships between two variables. • Learn about basic fundamentals about MATLAB/ SciLab and mathematical calculation with MATLAB/ SciLab software. • Comprehend the importance of sustainable ecosystem. • Clarify interdisciplinary nature of environmental issues. • Describe corrective measures for the abatement of pollution. • Identify the role of non-conventional energy resources in environmental protection. • Recognize various types of disasters. • Understand the basic components of Computers, Internet and issues of abuses/ attacks on

	information and computers. • Use comfortably Computer, Laptop, Mobiles, Internet Utilities and Install / Configure OS. • Assemble a PC and connect it to external devices. • Work with Office Practiced Automation Tools. • Create worksheets and Prepare presentations.
PO5: Perform task under close supervision with some responsibility for own work within defined limit.	• Sketch natural designs. • Draw abstract designs. • Realize Indian traditional textile. • Sketch folk art. • Operate machine used for garment manufacturing.

11. SUBJECTS & CONTENTS

(FIRST YEAR)

FIRST SEMESTER

1.1 ENGLISH & COMMUNICATION SKILLS – I

L	P
2	2

RATIONALE

Language as the most commonly used medium of self-expression remains indispensable in all spheres of human life –personal, social and professional. This course is intended to break fresh ground in teaching of Communicative English as per the requirements of National Skill Quality Framework. This course is designed to help students to acquire the concept of communication and develop ability or skills to use them effectively to communicate with the individuals and community.

COURSE OUTCOMES

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

CO1: Identify the nuances of Communication, both Oral and Written.

CO2: Acquire knowledge of the meaning of communication, communication process and speaking skills.

CO3: Acquire enhanced vocabulary and in-depth understanding of Grammatical Structures and their usage in the communication.

CO4: Communicate effectively with an increased confidence to read, write and speak in English language fluently.

DETAILED CONTENTS

UNIT I

Reading

1.1 Techniques of reading: Skimming and Scanning

1.2 Extensive and Intensive Reading: Textual Study

1.3 Homecoming – R.N. Tagore

1.4 Life Sketch of Sir Mokshagundam Visvesvarayya

1.5 Life Sketch of Dr. Abdul Kalam

1.6 Narayan Murthy’s speech at LBSNA, Dehradun

UNIT II

Fundamentals of Communication

2.1 Concept and Process of Communication,

2.2 Types of Communication (Verbal Communication)

2.3 Barriers to Communication

2.4 Speaking Skill: Significance and essentials of Spoken Communication

2.5 Listening Skill: Significance and essentials of Listening

UNIT III

Grammar and Usage

3.1 Nouns

3.2 Pronouns

3.3 Articles

3.4 Verbs(Main and Auxiliary)

3.5 Tenses

UNIT IV

Writing Skills

4.1 Significance, essentials and effectiveness of Written Communication

4.2 Notice Writing

4.3 Official Letters and E-mails.

4.4 Frequently-used Abbreviations used in Letter-Writing

4.5 Paragraph Writing

4.6 Netiquettes

PRACTICAL EXERCISES

1 Reading

Reading Practice of lessons in the Lab Activity classes.

i. Comprehension exercises of unseen passages along with the lessons prescribed.

ii. Vocabulary enrichment and grammar exercises based on the selected readings.

iii. Reading aloud Newspaper headlines and important articles.

2 Fundamentals of Communication

i. Introducing oneself, others and leave- taking(talking about yourself)

ii. Just a minute (JAM) sessions: Speaking extempore for one minute on given topics

iii. Situational Conversation: Offering-Responding to offers; Congratulating; Apologising and Forgiving; Complaining; Talking about likes and dislikes, Self-introduction Mock Interviews.

3 Grammar and Usage

i. Written and Oral Drills will be undertaken in the class to facilitate holistic linguistic competency among learners.

ii. Exercises on the prescribed grammar topics.

4 Writing Skills

i. Students should be given Written Practice in groups so as to inculcate team-spirit and collaborative learning .

ii. Group exercises on writing paragraphs on given topics.

iii. Opening an e-mail account, receiving and sending emails

RECOMMENDED BOOKS

1. Alvinder Dhillon and Parmod Kumar Singla, "Text Book of English and Communication Skills Vol – 2", M/S Abhishek Publications, Chandigarh.
2. V Sasikumar & PV Dhamija, "Spoken English", Tata MC Graw Hills, New Delhi, Second Edition.
3. JK Gangal, "A Practical Course in Spoken English", PHI Learning Pvt. Ltd., New Delhi.
4. NK Aggarwal and FT Wood, "English Grammar, Composition and Usage", Macmillan Publishers India Ltd., New Delhi.
5. RC Sharma and Krishna Mohan, "Business Correspondence & Report writing", Tata MC Graw Hills, New Delhi, Fourth Edition.
6. Kavita Tyagi & Padma Misra, "Professional Communication", PHI Learning Pvt. Ltd., New Delhi.
7. Nira Konar, "Communication Skills for professionals", PHI Learning Pvt. Ltd., New Delhi.
8. Krishna Mohan & Meera Banerji, "Developing Communication Skills", Macmillan Publishers India Ltd., New Delhi, Second Edition
9. M. Ashraf Rizwi, "Effective Technical Communication", Tata MC Graw Hills, New Delhi.
10. Andrea J Rutherfoord, "Basic Communication Skills for Technology", Pearson Education, New Delhi.

INSTRUCTIONAL STRATEGY

This is practice based subject and topics taught in the class should be practiced in the Lab regularly for development of required communication skills in the students. This subject contains four units of equal weight age.

1.2 APPLIED MATHEMATICS – I

L	P
4	-

RATIONALE

Contents of this course provide fundamental base for understanding engineering problems and their solution algorithms. Contents of this course will enable students to use basic tools like logarithm, binomial theorem, matrices, t-ratios and co-ordinates for solving complex engineering problems with exact solutions in a way which involve less computational task. By understanding the logarithm, they will be able to make long calculations in short time and it is also a pre-requisite for understanding Calculus.

COURSE OUTCOMES

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

CO1: Understand the geometric shapes used in engineering problems by Co-ordinate Geometry and Trigonometry.

CO2: Formulate engineering problems into mathematical formats with the use matrices, co-ordinate geometry and trigonometry

CO3: Calculate the approximate value of roots of certain expressions in engineering problems by application of binomial theorem.

CO4: Explore the idea of location, graph, and linear relationships between two variables.

CO5: Learn about basic fundamentals about MATLAB/ SciLab and mathematical calculation with MATLAB/ SciLab software.

DETAILED CONTENTS

UNIT I

Algebra

1.1 Complex Numbers: definition of complex number, real and imaginary parts of a complex number, Polar and Cartesian Form and their inter conversion, Conjugate of a complex number, modulus and amplitude, addition subtraction, multiplication and division of complex numb

1.2 Logarithms and its basic properties

UNIT II

Binomial Theorem, Determinants and Matrices

2.1 Meaning of ${}^{n}p_{r}$ & ${}^{n}c_{r}$ (mathematical expression). Binomial theorem (without proof) for positive integral index (expansion and general form); binomial theorem for any index (expansion up to 3 terms - without proof), first binomial approximation with application to engineering problems.

2.2 Determinants and Matrices – Evaluation of determinants (upto 2^{nd}order), solution of equations (upto 2 unknowns) by Crammer's rule, definition of Matrices and its types, addition, subtraction and multiplication of matrices (upto 2^{nd} order).

UNIT III

Trigonometry

3.1 Concept of angle, measurement of angle in degrees, grades, radians and their conversions.

3.2 T-Ratios of Allied angles (without proof), Sum, Difference formulae and their applications (without proof). Product formulae (Transformation of product to sum, difference and vice versa

3.3 Applications of Trigonometric terms in engineering problems such as to find an angle of elevation, height, distance etc.

UNIT IV

Co-ordinate Geometry

4.1 Cartesian and Polar co-ordinates (two dimensional), Distance between two points, mid-point, centroid of vertices of a triangle.

4.2 Slope of a line, equation of straight line in various standards forms (without proof); (slope intercept form, intercept form, one-point form, two-point form, symmetric form, normal form, general form), intersection of two straight lines, concurrency of lines, angle between straight lines, parallel and perpendicular lines, perpendicular distance formula, conversion of general form of equation to the various forms.

UNIT V

Geometry of Circle and Software

Circle

5.1 General equation of a circle and its characteristics. To find the equation of a circle, given:

I. Centre and radius
II. Three points lying on it
III. Coordinates of end points of a diameter

Software

5.2 **MATLAB Or SciLab software –** Theoretical Introduction, MATLAB or Scilab as Simple Calculator (Addition and subtraction of values –Trigonometric and Inverse Trigonometric functions) – General Practice

RECOMMENDED BOOKS

1. R. D. Sharma, "Applied Mathematics – I & II for Diploma Courses", Dhanpat Rai Publications.
2. "Mathematics for Class XI", NCERT Publication, New Delhi.
3. "Mathematics for Class XII", NCERT Publication, New Delhi.
4. H. K Dass, "Applied Mathematics for Polytechnics", CBS Publishers & Distributers.
5. A Ganesh and G Balasubramanian, "Textbook of Engineering Mathematics – I", CBS Publisher, New Delhi.
6. A Ganesh and G Balasubramanian, "Textbook of Engineering Mathematics –II", CBS Publisher, New Delhi.
7. G. B. Thomas, R. L. Finney, "Calculus and Analytic Geometry", Addison Wesley, Ninth Edition.
8. B S Grewal, "Elementary Engineering Mathematics", Khanna Publishers, Delhi, Thirty-fifth edition.
9. R.K. Jain and S.R.K. Iyengar, "Advanced Engineering Mathematics", Narosa Publishing House, New Delhi, Second Edition, 2003.
10. SS Sabharwal & Dr Sunita Jain, "Applied Mathematics Vol. I & II", Eagle Parkashan, Jalandhar.
11. S Kohli, "Engineering Mathematics Vol. I & II", IPH, Jalandhar.
12. Reena Garg & Chandrika Prasad, "Advanced Engineering Mathematics", Khanna Publishing House, New Delhi
13. R. Pratap, "Getting Started with MATLAB 7", Oxford University Press, Seventh Edition.
14. E-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

SUGGESTED WEBSITES

1. http://swayam.gov.in
2. https://www.scilab.org

INSTRUCTIONAL STATREGY

This is theoretical subject and contains five units of equal weight age. Basic elements of algebra, trigonometry and co-ordinate geometry can be taught in the light of their applications in the field of engineering and technology. By laying more emphasis on applied part, teacher can also help in providing a good continuing education base to the students. Students need to be taught the skills needed to use software tools built by experts through multiple problem solving based on the topics related to Algebra, Trigonometry and Coordinate Geometry that the industry requires. Examples to be used should be related to engineering. Useful software MATLAB or open source software SciLab can be taught theoretically by books/online literatures and basic operations can be shown practically with practical software laboratory or small mobile apps of these software or authentic Trial version of MATLAB/ SciLab software. Students should be able to relate to the actual use of these examples and the way mathematical calculations will help them in doing their job.

1.3 APLIED PHYSICS

L	P
2	2

RATIONALE

Applied physics includes the study of a large number of diverse topics all related to things that go on in the world around us. It aims to give an understanding of this world both by observation and by prediction of the way in which objects will behave. Concrete use of physical principles and analysis in various technical fields are given prominence in the course content.

COURSE OUTCOMES

After completing this subject, student should be able to:

CO1: Identify physical quantities, select their units and make measurements with accuracy.

CO2: Represent physical quantities as scalar and vector and identify type of motions, various forms of energy, their conversion and applications.

CO3: Elaborate scientific work, energy and power, forms of friction and solve problems related to them.

CO4: Comprehend properties of matter and effect of temperature on various matter and phenomenon.

CO5: Demonstrate the use of physical principles and analysis in various technical fields.

DETAILED CONTENTS

UNIT I

Unit and Dimensions

1.1 Definition of Physics, physical quantities- fundamental and derived

1.2 Units: fundamental and derived

1.3 System of units: CGS, FPS, MKS, SI

1.4 Dimension, dimensional formulae and SI units of physical quantities-distance, displacement, area, volume, density, velocity, acceleration, linear momentum, force, impulse, work, power, energy, pressure, surface tension, stress, strain)

1.5 Dimensional equations, principle of homogeneity of dimensional equation

1.6 Application of dimensional analysis: checking the correctness of physical equation, conversion of system of unit (force, work, acceleration)

UNIT II

Force and Motion

2.1 Scalar and vector quantities– definition and examples, representation of vector, types of vector (unit vector, position vector, co-initial vector, collinear vector, co-planar vector)

2.2 Vector algebra- addition of vectors, Triangle & Parallelogram law (statement and formula only),

2.3 Scalar and vector product (statement and formula only)

2.4 Force and its units, resolution of force (statement and formula only)

2.5 Newton's laws of motion (statement and examples)

2.6 Linear momentum, Law of conservation of linear momentum (statement and examples), Impulse

2.7 Circular motion: definition of angular displacement, angular velocity, angular acceleration, frequency, time period; Relation between linear and angular velocity, centripetal and centrifugal forces (definition and formula only), application of centripetal force in banking of road

2.8 Rotational motion: definition with examples

2.9 Definition of torque, angular momentum, moment of inertia and its physical significance

UNIT III

Work, Power and Energy

3.1 Work- definition, symbol, formula and SI unit, types of work (zero work, positive work and negative work) with example

3.2 Friction– definition and its simple daily life applications

3.3 Power- definition, formula and units

3.4 Energy- definition and its SI unit, examples of transformation of energy.

3.5 Kinetic energy- definition, examples, formula and its derivation

3.6 Potential energy- definition, examples, formula and its derivation

3.7 Law of conservation of mechanical energy for freely falling bodies (with derivation)

3.8 Simple numerical problems based on formula of Power and Energy

UNIT IV

Properties of Matter

4.1 Elasticity and plasticity- definition, deforming force, restoring force, example of elastic and plastic body

4.2 Definition of stress and strain, Hooke's law, modulus of elasticity

4.3 Pressure- definition, atmospheric pressure, gauge pressure, absolute pressure, Pascal's law

4.4 Surface tension- definition, SI unit, applications of surface tension, effect of temperature on surface tension

4.5 Viscosity: definition, unit, examples, effect of temperature on viscosity

UNIT V

Heat and Temperature

5.1 Definition of heat and temperature (on the basis of kinetic theory)

5.2 Difference between heat and temperature

5.3 Principle and working of mercury thermometer

5.4 Modes of transfer of heat- conduction, convection and radiation with examples.

5.5 Properties of heat radiation

5.6 Different scales of temperature and their relationship

PRACTICAL EXERCISES

1. Familiarization of measurement instruments and their parts (for example - vernier calliper, screw gauge, spherometer, travelling microscope etc.), and taking a reading. (compulsory to all students)
2. To find diameter of solid cylinder using a vernier calliper
3. To find internal diameter and depth of a beaker using a vernier calliper and hence find its volume.
4. To find the diameter of wire using screw gauge
5. To find thickness of paper using screw gauge.
6. To determine the thickness of glass strip using a spherometer
7. To determine radius of curvature of a given spherical surface by a spherometer.
8. To verify parallelogram law of force
9. To determine the atmospheric pressure at a place using Fortin's Barometer
10. To determine force constant of spring using Hooke's law
11. Measuring room temperature with the help of thermometer and its conversion in different scale.

RECOMMENDED BOOKS

1. "Text Book of Physics for Class XI (Part-I, Part-II)", N.C.E.R.T., Delhi.
2. Dr. HH Lal, "Applied Physics, Vol. I and Vol. II", TTTI Publications, Tata McGraw

Hill, Delhi.
3. AS Vasudeva, "Applied Physics – I", Modern Publishers, Jalandhar.
4. R A Banwait, "Applied Physics – I", Eagle Prakashan, Jalandhar.
5. E-books/e-tools/relevant software to be used as recommended by AICTE/ HSBTE/ NITTTR.
6. C. L. Arora, "Practical Physics", S Chand Publication.

SUGGESTED WEBSITES

1. http://swayam.gov.in
2. The Physics Classroom
3. https://www.khanacademy.org/science/physics

INSTRUCTIONAL STATREGY

This is hands-on practice based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills in the students. This subject contains five units of equal weight age. Teacher may use various teaching aids like models, charts, graphs and experimental kits etc. for imparting effective instructions in the subject. Students need to be exposed to use of different sets of units and conversion from one unit type to another. Software may be used to solve problems involving conversion of units. The teacher should explain about field applications before teaching the basics of mechanics, work, power and energy, rotational motion, properties of matter etc. to develop proper understanding of the physical phenomenon. Use of demonstration can make the subject interesting and develop scientific temper in the students. Teachers should give examples of engineering/technology applications of various concepts and principles in each topic so that students are able to appreciate learning of these concepts and principles. In all contents, SI units should be followed. Working in different sets of units can be taught through relevant software.

1.4 APPLIED CHEMISTRY

L	P
3	2

RATIONALE

The regular use of a variety of chemistry based materials and processes in diverse technical and engineering fields have repeatedly proven the importance of Applied Chemistry and its role in current and future technological advancements. Ever increasing use of chemical materials in the emerging engineering applications demands engineers and technocrats to acquire an in-depth knowledge of Applied Chemistry to be able to choose the best suited materials to meet their needs while maintaining the environment sustainability. An understanding of the principles of Applied Chemistry will develop scientific attitude in the budding engineers to understand the physical and chemical properties of the available materials for engineering applications as well as an ability to design new and effective materials.

COURSE OUTCOMES

After studying this course, students will be able to:

CO1: Classify the elements into metals, non-metals and metalloids.

CO2: Explain the extraction of metals from ores, their mechanical properties and modification of properties by alloy formation.

CO3: Classify fuels and lubricants and apply them in different engineering applications.

CO4: Identify the polymeric materials, assess their properties and design suitable polymeric materials for current and future applications.

CO5: Apply effective methods for corrosion prevention

DETAILED CONTENTS

UNIT 1

Atomic Structure, Periodic Table and Chemical Bonding.

1.1 Bohr's model of atom (qualitative treatment only), dual character of matter: derivation of de-Broglie's equation, Heisenberg's Principle of Uncertainty, modern concept of atomic structure: definition of orbitals, shapes of s, p and d-orbitals, quantum numbers and their significance. Electronic configuration: Aufbau and Pauli's exclusion principles and Hund's rule, electronic configuration of elements up to atomic number 30.

1.2 Modern Periodic law and Periodic table, classification of elements into s, p, d and f-blocks, metals, non-metals and metalloids (periodicity in properties excluded).

1.3 Chemical bonding: cause of bonding, ionic bond, covalent bond, and metallic bond (electron sea or gas model), Physical properties of ionic, covalent and metallic substances.

UNIT II

Metals and Alloys

2.1 Metals: mechanical properties of metals such as conductivity, elasticity, strength and stiffness, luster, hardness, toughness, ductility, malleability, brittleness, and impact resistance and their uses.

2.2 Definition of a mineral, ore, gangue, flux and slag. Metallurgy of iron from haematite using a blast furnace. Commercial varieties of iron.

2.3 Alloys: definition, necessity of making alloys, composition, properties and uses of duralumin and steel. Heat treatment of steel- normalizing, annealing, quenching, tempering.

UNIT III

Water, Solutions, Acids and Bases

3.1 Solutions: definition, expression of the concentration of a solution in percentage (w/w, w/v and v/v), normality, molarity and molality and ppm. Simple problems on solution preparation.

3.2 Arrhenius concept of acids and bases, strong and weak acids and bases, pH value of a solution and its significance, pH scale. Simple numerical problems on pH of acids and bases.

3.4 Hard and soft water, causes of hardness of water, types of hardness – temporary and permanent hardness, expression of hardness of water, ppm unit of hardness; disadvantages of hard water; removal of hardness: removal of temporary hardness by boiling and Clark's method; removal of permanent hardness of water by Ion-Exchange method; boiler problems caused by hard water: scale and sludge formation, priming and foaming, caustic embrittlement; water sterilization by chlorine, UV radiation and RO.

UNIT IV

Fuels and Lubricants

4.1 Fuels: definition and classification of higher and lower calorific values, units of calorific value, characteristics of an ideal fuel. Petroleum: composition and refining of petroleum; gaseous fuels: composition, properties and uses of CNG, PNG, LNG, LPG; relative advantages of liquid and gaseous fuels over solid fuels. Scope of hydrogen as future fuel.

4.2 Lubricants- Functions and qualities of a good lubricant, classification of lubricants with examples; lubrication mechanism (brief idea only); physical properties (brief idea only) of a

lubricant: oiliness, viscosity, viscosity index, flash and fire point, ignition temperature, pour point.

UNIT V

Polymers and Electrochemistry

5.1 Polymers and Plastics: definition of polymer, classification, addition and condensation polymerization; preparation properties and uses of polythene, PVC, Nylon-66, Bakelite; definition of plastic, thermoplastics and thermosetting polymers; natural rubber and neoprene, other synthetic rubbers (names only).

5.2 Corrosion: definition, dry and wet corrosion, factors affecting rate of corrosion, methods of prevention of corrosion—hot dipping, metal cladding, cementation, quenching, cathodic protection methods

5.3 Introduction and application of nanotechnology: nano-materials and their classification, applications of nanotechnology in various engineering applications (brief).

PRACTICAL EXERCISES

1. To prepare standard solution of oxalic acid.
2. To dilute the given $KMnO_4$ solution
3. To find out the strength in grams per litre of an unknown solution of sodium hydroxide using a standard (N/10) oxalic acid solution.
4. To find out the total alkalinity in parts per million (ppm) of a water sample with the help of a standard sulphuric acid solution.
5. To determine the total hardness of given water sample by EDTA method
6. To determine the amount of total dissolved solids(TDS) in ppm in a given sample of water gravimetrically
7. To determine the pH of different solutions using a digital pH meter.
8. To determine the calorific value of a solid/liquid fuel using a Bomb calorimeter.
9. To determine the viscosity of a lubricating oil using a Redwood viscometer
10. To prepare a sample of Phenol-formaldehyde resin (Bakelite)/Nylon-66 in the lab.

RECOMMENDED BOOKS

1. Textbook of Chemistry for class XI and XII (part I & II) NCERT, Delhi, 2017-18.
2. C.N. R. Rao, Understanding Chemistry, Universities Press (India) Pvt. Ltd, 2011.
3. Jain & Jain, Engineering Chemistry, Dhanpat Rai and Sons; New Delhi, 2015.

4. Dr. G. H. Hugar& Prof A. N. Pathak, Applied Chemistry Laboratory Practices, Vol. I and Vol. II, NITTTR, Chandigarh, Publications, 2013-14.
5. Agnihotri, Rajesh, Chemistry for Engineers, Wiley India Pvt. Ltd, 2014.
6. Applied Chemistry by Usha Raju.

SUGGESTED WEBSITES

1.www.chemguide.co.uk/atommenu.html (Atomic structure and chemical bonding)
2.www.visionlearning.com (Atomic structure and chemical bonding)
3. www.cheml.com (Atomic structure and chemical bonding)
4. https://www.wastewaterelearning.com/elearning/ (Water treatment)
5. www.capital-refractories.com (Metals, Alloys, Cement, and Refractory Materials) 6.www.em-ea.org/guide%20books/book-2/2.1%20fuels%20and%20combustion.pdf(Fuel and combustion)

INSTRUCTIONAL STRATEGY

Teachers may take help of various models and charts while imparting instructions to make the concept clear. More emphasis should be laid on discussing and explaining practical applications of various chemical process and reactions. In addition, students should be encouraged or motivated to study those processes in more details, which may find practical application in their future professional career. This subject contains five units of equal weightage.

1.5 TEXTILE FIBRES

L	P
2	4

RATIONALE

Textile Technology students have to work in textile mill/ testing houses. Textile fibres is the basic raw material for yarn and fabric. So a textile technologist should know about the production of fibres. Knowledge of the fibre morphology, structure, properties and end use of different fibres is also essential. This subject will help in better use of fibres in blends independently.

COURSE OUTCOMES

After undergoing the subject, students will be able to:

CO1: Classify different natural fibres.
CO2: List the properties of natural fibres.
CO3: Learn about the manufacturing process of manmade fibres .
CO4: Identify different manmade fibres.
CO5: Summarize the properties of manmade fibres.
CO6: Predict the end uses of various textile fibres.

DETAILED CONTENTS

UNIT I

Introduction

General concept of Textile, fiber, yarn, fabrics and wet processing. Definition of Textile fiber and filament. Classification of Textile fibers according to nature and origin. General physical properties of Textile Fibers. General chemical properties of Textile Fibers.

UNIT II

Natural Fibers - Cotton

Origin and nature of Cotton fibres. Appearance, Longitudinal and cross sectional view of cotton fibres (structure). Chemical structure of cotton fibre. Impurities in cotton. Physical & chemical properties of Cotton fibres. End use of Cotton Fibre.

Unit III

Natural Fibers -Wool, Silk and Jute

Origin, nature and appearance of Wool Fibre. Impurities in wool. Physical & chemical properties of Wool Fibre. End use of Wool.

Origin, nature and appearance of Silk Fibre. Impurities in Silk. Physical & chemical properties of Silk Fibre. End use of Silk

Origin, nature and appearance of Jute Fibre. Impurities in Jute. Physical & chemical properties of Jute Fibre. End use of Jute

Unit IV

Regenerated Fibers

Monomers of regenerated fibres. Sequence of steps for making fibre. formula, physical & chemical properties Viscose rayon. End use of Viscose rayon.

Monomers of regenerated fibres Acetate rayon. Sequence of steps for making fibre. formula, physical & chemical properties Acetate rayon. End use of Acetate rayon

Unit V

Synthetic Fibers

Monomers, formula, physical properties, chemical properties, and end use of Acrylic and modified Acrylic fibre.

Monomers, formula, physical properties, chemical properties, and end use of nylon6 and nylon 66.

Monomers, formula, physical properties, chemical properties, and end use of Polyester.

Monomers, formula, physical properties, chemical properties, and end use of Spandex and Lycra.

PRACTICAL EXERCISES

1. Microscopic view of cotton Fiber.
2. Physical and chemical identification of cotton Fiber.
3. Microscopic view of wool Fiber.
4. Physical and chemical identification of wool Fiber.
5. Microscopic view of silk Fiber.
6. Physical and chemical identification of silk Fiber.
7. Microscopic view of rayon Fiber.
8. Physical and chemical identification of rayon Fiber.
9. Microscopic view of acrylic Fiber.
10. Physical and chemical identification of acrylic Fiber.

11. Microscopic view of nylon Fiber.
12. Physical and chemical identification of nylon Fiber.
13. Microscopic view of polyester Fiber.
14. Physical and chemical identification of polyester Fiber.

RECOMENDED BOOKS

1. Gohl and Vilensky, “Textile Science” by CBS Publishers and Distributors Delhi.
2. V.A. Shanai, “Introduction to Textile Fibers” by, Sevak Publications Mumbai
3. From Fibre to Fabric Tata Mc-Graw hill
4. Jindal & Jindal, “Textile Raw Materials” by Abhishek Publishers Chandigarh

SUGGESTED WEBSITES

1. https://www.youtube.com/channel/UCnPu8vcBvMdV5wtPTxC4uLA
2. https://textilelearner.net/what-is-textile-basic-textiles/
3. https://textilestudycenter.com/

INSTRUCTIONAL STRATEGY

This is a skill based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills in students. This subject contains five units of equal weight age.

1.6 SEWING AND INDIAN TEXTILE ILLUSTRATIONS

L	P
-	6

RATIONALE

A student in Textile Technology shall have a practical hands on experience in various type of art making and its appreciations. Learning of various basic methods of science behind designs and placement of designs is essential. A woven fabric is finally to be stitched. This subject will provide basic knowledge of the process that will help in development of fabric.

COURSE OUTCOMES

After undergoing the subject, students will be able to:

CO1: Sketch natural designs.
CO2: Draw abstract designs.
CO3: Realize Indian traditional textile.
CO4: Sketch folk art.
CO5: Operate machine used for garment manufacturing.

PRACTICAL EXERCISES

UNIT 1

1. Construction and arrangement of figures on various basis General figure of Drop base.
2. Construction and arrangement of figures on various basis Half Drop Base Design
3. Construction and arrangement of figures on various basis Diamond Base.
4. Construction and arrangement of figures on various basis Ogge Base.

UNIT II

1. Construction and arrangement of figures on various basis Half drop strip design.
2. Construction and arrangement of figures on various basis Drop reverse base.
3. Construction and arrangement of figures on various basis Sateen Base.
4. Draw a Natural (realistic) figure or conventional (Oriental) figure.
5. Draw a Geometrical/ Abstract assigned.

UNIT III

1. Study Kashmir embroidery with reference to Historical significance.
2. Study Himachal – Chamba Rumal of Indian embroidered textiles with reference to textiles.
3. Study Phulkari with reference to textiles.
4. Study Kantha with reference to Historical significance.
5. Draw Chikan Kari/ Kasuti/ Kathiawar with reference to appreciation.

UNIT IV

1. To work out on type of Sewing Machine and their parts available in lab.
2. Tools and equipment used with sewing machine.

UNIT V

1. To study type of sewing threads and needles used in lab of the institute.
2. To have and hand on experience on the sewing machine.

RECOMMENDED BOOKS

1. Carr and Lathem, "The Technology of Clothing Manufacturing" by Blackwell Science Ltd., second edition, 1994.
2. P. V. Mehta, "Managing Quality in Apparel Industry" by New age International Publisher. ND.
3. S.S. Satsangi, "V Garment Finishing and Care Labeling" by M/s Usha Publishers, Delhi
4. Bernard P Corbman, "Textile Fibres and Fabrics" by M/s Mc Graw-Hill, International Edition
5. Subhashini Aryan, "Folk Embroidery of Himachal Pradesh"
6. Chetna Desai, "Ikat Textile of India"
7. Kamla Dev Chattopadya, "Indian Painted Textiles"
8. Marq, "Carpets of India"
9. Sukla Das, "Fabric Art heritage of India"
10. Jasleen Dhamija, "Hand Woven Fabric of India"
11. Kamla Dev Chattapodya, "Indian Sari"
12. Veronica Murphy, "Tie Dyed Textile of India"
13. Jasleen Dhamija, "Hand Woven Fabrics of India"
14. John Gillow, "Traditional Indian Textiles"
15. Kyoto Shoin, "Textile Art of India"

SUGGESTED WEBSITES

1. https://www.youtube.com/channel/UCnPu8vcBvMdV5wtPTxC4uLA
2. https://textilelearner.net/what-is-textile-basic-textiles/
3. https://textilestudycenter.com/

INSTRUCTIONAL STRATEGY

This is hands on practice based workshop for development of required skills in the students. This subject contains five units of equal weight age.

1.7 ENVIRONMENTAL STUDIES AND DISASTER MANAGEMENT

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2	-

RATIONALE

A diploma holder must have knowledge of different types of pollution caused due to industrial and construction activities so that he/she may help in balancing the ecosystem and controlling pollution by various control measures. The course is intended to provide a general concept in the dimensions of environmental pollution and disasters caused by nature beyond the human control as well as the disasters and environmental hazards induced by human activities with emphasis on disaster preparedness, response and recovery.

COURSE OUTCOMES

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

CO1: Comprehend the importance of sustainable ecosystem.
CO2: Clarify interdisciplinary nature of environmental issues.
CO3: Describe corrective measures for the abatement of pollution.
CO4: Identify the role of non-conventional energy resources in environmental protection.
CO5: Recognize various types of disasters.

DETAILED CONTENTS

UNIT I

Introduction

1.1 Basics of ecology, eco system- concept, and sustainable development, Sources, advantages, disadvantages of renewable and nonrenewable energy.
1.2 Rain water harvesting
1.3 Deforestation – its effects & control measures

UNIT II

Air and Noise Pollution

2.1 Air Pollution: Source of air pollution. Effect of air pollution on human health, economy, Air pollution control methods.

2.2 Noise Pollution: Source of noise pollution, Unit of noise, Effect of noise pollution, Acceptable noise level, Different method of minimizing noise pollution.

UNIT III

Water and Soil Pollution

3.1 Water Pollution: Impurities in water, Cause of water pollution, Source of water pollution. Effect of water pollution on human health, Concept of DO, BOD, COD. Prevention of water pollution- Water treatment processes, Sewage treatment. Water quality standard.

3.2 Soil Pollution :Sources of soil pollution, Effects and Control of soil pollution, Types of Solid waste- House hold, Industrial, Agricultural, Biomedical, Disposal of solid waste, Solid waste management E-waste, E – waste management

UNIT IV

Impact of Energy Usage on Environment

Global Warming, Green House Effect, Depletion of Ozone Layer, Acid Rain. Eco-friendly Material, Recycling of Material, Concept of Green Buildings, Concept of Carbon Credit & Carbon footprint.

UNIT V

Disaster Management

A. Different Types of Disaster:

Natural Disaster: such as Flood, Cyclone, Earthquakes and Landslides etc.

Man-made Disaster: such as Fire, Industrial Pollution, Nuclear Disaster, Biological Disasters, Accidents (Air, Sea Rail & Road), Structural failures(Building and Bridge), War & Terrorism etc.

B. Disaster Preparedness:

Disaster Preparedness Plan

Prediction, Early Warnings and Safety Measures of Disaster

Psychological response and Management (Trauma, Stress, Rumour and Panic)

RECOMMENDED BOOKS

1. Environmental Studies by S.C. Sharma & M.P. Poonia, Khanna Publishing House, New Delhi
2. Environmental and Pollution Awareness by Sharma BR; Satya Prakashan, New Delhi.
3. Environmental Pollution by Dr. RK Khitoliya; S Chand Publishing, New Delhi
4. Environmental Studies by Erach Bharucha; University Press (India) Private Ltd., Hyderabad.

5. Environmental Engineering and Management by Suresh K Dhamija; S K Kataria and Sons, New Delhi.
6. E-books/e-tools/relevant software to be used as recommended by AICTE/BTE/NITTTR, Chandigarh.
7. Disaster Management by Dr. Mrinalini Pandey, Wiley India Pvt. Ltd.
8. Disaster Science and Management by Tushar Bhattacharya, McGraw Hill Education (India) Pvt. Ltd.

INSTRUCTIONAL STRATEGY

In addition to theoretical instructions, different activities pertaining to Environmental Studies and Disaster Management like expert lectures, seminars, visits etc. may also be organized This subject contains five units of equal weightage.

SECOND SEMESTER

SECOND SEMESTER

2.1 WEAVING PREPARATORY PROCESSES

L	P
3	2

RATIONALE

The selection of suitable yarns and the preparation of yarn for weaving have a considerable influence on weaving efficiency. The efficiency of loom shed is highly influenced by the weaving ability of warp and weft yarn which is incorporated by many weaving preparatory processes like Winding, Warping, Sizing and Drawing-in. This subject is to acquaint the students with these processes.

COURSE OUTCOMES

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

CO1: Classify various processes of weaving preparatory.
CO2: Summarize different methods/ machines of winding, warping, sizing.
CO3: Study the constructional details and the latest developments in these machines.
CO4: Acquire the knowledge of various sizing ingredients.
CO5: Calculate the quantity of warp and weft yarn to weave a definite length of fabric.

DETAILED CONTENTS

UNIT I

Introduction and Warp Winding

Introduction to yarn preparation and its objectives. Sequence of process involved in the preparatory processes. Different types of yarn packages.

Objects of warp winding. Conventional Winding machine and its limitations. Construction detail and working of high speed winding machine. Different types of tensioners. Balloon-breaker and its functions. Various stop motions.

UNIT II

Modern Winding Machine and Weft Winding

Main features and working of modern winding machines - Auto coner.

Study of common faults in warp winding.

Objects of weft winding. Main features of high speed pirn winding machine.

Study of common faults in pirn winding.2

UNIT III

Warping

Objects of Warping. Different systems of warping and their limitations. Types of creels. Features of ordinary beam warping machine and its limitations. Features of high speed beam warping machine.

Working of sectional warping machine and its limitations.

Study of common faults in warping.

UNIT IV

Sizing

Objects of sizing. Various methods of sizing. Study of slasher sizing machine and passage of yarn through it. Measuring and marking motion. Method of drying sized warp, comparison of Multi-cylinder and hot air drying. Various types of sizing ingredients and their objects. Various factors on which percentage size take up depends.

UNIT V

Drawing-in and Calculations

Introduction to drawing-in. Different methods of drawing-in. Precautions to be taken during drawing-in.

Calculation regarding creel capacity. Number of sections, width of sections for sectional warping machine. Calculation of production of Winding, Warping and Sizing machines.

PRACTICAL EXERCISES

1. To study the passage of material and working of high-speed winding machine.
2. To study the passage of material and working of auto-coner.
3. To study the common faults in warp-winding, their causes and remedies.
4. To study the passage of material and working of high speed pirn winding machine.
5. To compare different types of creels used in warping.
6. To compare different types of tensioners used in warping.
7. To study the passage of material through direct warping machine.
8. To study the passage of material through sectional warping machine.
9. To study common faults in warping and their remedies.
10. To study the passage of material through slasher sizing machine.
11. To study important parts of the size box.

12. To study the process of drawing-in.

RECOMMENDED BOOKS

1. R Sen Gupta, “Yarn Preparation” Vol. I (Popular Prakashan, 1963)
2. R Sen Gupta, “Yarn Preparation” Vol. II
3. R Sen Gupta, “ Weaving Calculation” (Mahajan Book Distributor,1990)
4. “Warping and Sizing” Bombay Textile Research Association.
5. “Winding” – Bombay Textile Research Association
6. “Weaving Calculation”- WIRA
7. “Sizing by Ajgaonkar” et.al

SUGGESTED WEBSITES

1. https://www.youtube.com/channel/UCnPu8vcBvMdV5wtPTxC4uLA
   https://textilelearner.net/what-is-textile-basic-textiles/
2. https://textilestudycenter.com/

INSTRUCTIONAL STRATEGY

This is a skill based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills in the students. This subject contains five units of equal weight age with hands on practice.

2.2 INTRODUCTION TO TEXTILE PROCESSES

L	P
3	4

RATIONALE

Knowledge of basic processes is very important for textile students. The process of making yarn helps both Textile Technology/Processing students' separately. A Textile Technology student use it for detailed study while a Textile processing student use property of yarn for help in dyeing/finishing. In case of fabric, technologist uses the knowledge of this subject further for specialized subjects, or to check the requirement of yarn accordingly. A Processing student uses it for matching dye and print on that fabric. This subject provides a brief introduction to various processes.

COURSE OUTCOMES

After undergoing the subject, students will be able to:

CO1: Classify various processes for making of yarn.
CO2: Learn how a woven fabric is made and its preparatory processes.
CO3: Differentiate between woven and knitted garments.
CO4: Distinguish various methods of knitting.
CO5: Calculate weight of yarn in different numbering systems.

DETAILED CONTENTS

UNIT I

Flow Chart of Textile Processes

Flow chart of raw material, machines, process and end product for conversion of fibre into yarn. Flow chart of raw material, machines, process and end product for conversion of yarn into woven or knitted fabric, and finished fabrics.

Opening and cleaning

Objects of mixing and blending. Comparison of mixing with blending. Objects of Blow room. Sequence of modern blow room line. Objects of Carding. Main parts of carding machine.

UNIT II

Fibre to Yarn

Objects of Draw frame. Draft and its type. Breaker and finisher draw frame. Objects of Lap former. Objects of Comber. Linking of lap former and comber. Objects of Speed frame and Ring frame. Main parts of Ring frame. Objects of Winding. Parts of Winding machine.

UNIT III

Yarn to Woven Fabric

Objects of Warping. Objects of Sizing. Different Sizing ingredients and their functions. Main parts of sizing machines. Objects of Threading and Drawing-in.

UNIT IV

Weaving

Terminology of Weaving, warp, weft. Passage of material through Loom. Parts of loom. Classifications of loom. Types of motions in loom. Primary. Secondary and auxiliary motions and its definitions.

Comparing knitted with woven fabrics. Comparing knitted with woven processes

UNIT V

Knitting

Definitions of Knitting, weft knitting, warp knitting, stitch, course, and wale. Passage of material through flat bed knitting machine. Passage of material through circular bed knitting machine. Discussing various type of Warp v/ s weft knitting.

Numbering System

Definition of numbering system. Defining direct system with reference to tex, denier. Defining indirect system with reference to English count. Relationship between tex, denier and English count.

PRACTICAL EXERCISES

1. Process flow chart of conversion of cotton fibre into yarn.
2. Drawing of a modern blow room line.
3. Give main parts of carding machine.
4. Give object of comber machine. Also name a few parts.
5. Give Drafting zone of Speed and Ring Frame.
6. Write sequence of conversion of yarn to woven fabric.
7. Passage of material through loom.

8. Passage of material through sizing machine.
9. Passage of material through flat bed knitting machine.
10. Passage of material through circular bed knitting machine.
11. Give different type of knitted fabric and their end use.
12. Discuss the numbering system.
13. Calculate the tex for a 1 km yarn weighing 50 gm.
14. Calculate the Denier of a 1 km yarn weighing 50 gm.
15. Calculate the English count of a 1 km yarn weighing 50 gm.

RECOMENDED BOOKS

1. Gohl and Vilensky, “Textile Science” by CBS Publishers and Distributors Delhi.
2. V.A. Shanai, “Introduction to Textile Fibers” by Sevak Publications Mumbai.
3. “From Fibre to Fabric” Tata Mc-Graw hill.
4. Jindal & Jindal, “Textile Raw Materials” by Abhishek Publishers Chandigarh.

SUGGESTED WEBSITES

1. https://www.youtube.com/channel/UCnPu8vcBvMdV5wtPTxC4uLA
2. https://textilelearner.net/what-is-textile-basic-textiles/

INSTRUCTIONAL STRATEGY

This is a skill based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills in the students. This subject contains five units equal weight age with hands on practice.

2.3 FABRIC STRUCTURE

L	P
3	4

RATIONALE

Textile Technology students have to work in weaving mills, textile testing houses and fabric quality control centers. They have to perform tasks relating to yarn requirement, design and complete order as per sample, for which knowledge/skills of fabric structure is essential. This subject will help student to understand different weaves from woven fabric samples, calculate weight of warp and weft required, weight of fabric with different dimension.

COURSE OUTCOMES

After undergoing the subject, students will be able to:

CO1: Identify and draw repeat, draft, peg plan and sectional view.
CO2: Compare and draw design from draft and peg plan and vice versa.
CO3: Learn the basic weaves i.e. plain weave, twill weave, satin/ sateen weave and their derivatives.
CO4: Sketch diamond, honeycomb and spot figuring design.
CO5: Calculate weight of warp, weft per square and linear yard, per square and linear meter.
CO6: Check warp, weft and fabric cover.

DETAILED CONTENTS

UNIT I

Woven Design Fundamental

Introduction, Representation of woven design- Interlacement diagram, graphical representation of woven fabric structure. Design, weave repeat unit or repeat size. Draft, types of draft-straight, pointed, skip and satin, broken, divided, group. Peg plan or lifting plan. Sectional view and denting plan. Relationship between design, draft, lifting plan and sectional view.

Plain Weave

Introduction characteristics and end use of plain weave. Derivatives of plain weave- warp rib, weft rib and hopsack weave. Derivatives of hopsack weave- Stitched, centre stitched, barley corn, twilled hopsack weave. Ornamentation of plain weave. Rib and cord effect and its prominence

UNIT II

Twill Weave

Introduction characteristics and end use of twill weave. Warp faced twill, weft face twill, right hand end and left hand end twill weave. Derivatives of twill weave- Pointed, waved, herring bone, Broken twill (By breaking at regular interval, by entering and skipping method), elongated and transposed Twill Weave. Balanced and unbalanced twill weave. Factor affecting the prominence of twill weave.

UNIT III

Satin/ sateen Weave

Introduction characteristics and end use of satin/sateen weave. Regular satin/sateen up to 12 ends. Irregular satin/sateen up to 12 ends.

Diamond and diaper

Characteristics, end use and comparison of Diamond and diaper. Diamond and diaper design upto 16 picks.

UNIT IV

Honey comb weave

Characteristics, end use and comparison. Ordinary and Brighton honey comb weave up to 16picks. Ordinary honey comb, rectangle design example 12x14 and 14x12.

Huck-a-Back and Mock Leno

Characteristics of Huck-a – Back and mock leno. Design, end use, and comparison of Huck-a – Back and mock leno.

Feature of Different Fabric - cambric, gabardine, chiffon, denim, jeans, voile, blanket and sponge cloth.

UNIT V

Rib and Cord Structures

Welt and pique- characteristics, end use and comparison Welt structure- ordinary, weft waded PNP configurations.

Welt and Pique structure - characteristics, end use and comparison of Welt and pique.

Bed ford cord - characteristics, end use and comparison with welt. Plain faced bed fort cord (Regular and alternate pick principle) Wadded bed ford cord, Twill faced bed ford cord.

PRACTICAL EXERCISES

1. To Representation of woven design- Interlacement diagram, graphical representation of woven fabric structure.
2. Draw from design- draft, lifting plan and sectional view.
3. Draw design from draft, lifting plan and sectional view.
4. To study EPI & PPI using Pick glass
5. To calculate warp and weft crime of yarn from given fabric
6. To study warp and weft count from fabric using Beesley balance
7. Catch-cord technique for weaving- plain weave. To calculate weight of warp and weft, weight per sq. yard, weight per sq. meter, weight per running yard and weight per running meter, warp cover, weft cover and fabric cover of the given plain fabric sample (At least Two Samples).
8. To draw design draft and peg plan and warp color plan of the above sample at 7.
9. Catch-cord technique for weaving- Twill weave. To calculate weight of warp and weft, weight per sq. yard, weight per sq. meter, weight per running yard and weight per running meter, warp cover, weft cover and fabric cover of the given Twill fabric sample (At least Two Samples).
10. To draw design draft and peg plan and warp color plan of the above sample at 10.
11. Catch-cord technique for weaving- Satin / Sateen weave. To calculate weight of warp and weft, weight per sq. yard, weight per sq. meter, weight per running yard and weight per running meter, warp cover, weft cover and fabric cover of the given Sati/ Sateen fabric sample.
12. To draw design draft and peg plan and warp color plan of the above Sateen/ Sateen sample.
13. To calculate weight of warp and weft, weight per sq. yard, weight per sq. meter, weight per running yard and weight per running meter, warp cover, weft cover and fabric cover of the given diamond / diaper/ honeycomb fabric sample.
14. To draw design draft and peg plan and warp color plan of the above diamond / diaper/ honeycomb fabric sample.
15. To calculate weight of warp and weft, weight per sq. yard, weight per sq. meter, weight per running yard and weight per running meter, warp cover, weft cover and fabric cover of the given huck- a – back or spot figuring fabric sample.
16. To draw design draft and peg plan and warp color plan of the above huck- a – back or spot figuring

RECOMMENDED BOOKS

1. Z. J. Grosicki, “Watson’s Textile Design & Colour”Part-I by Woodhead Publishing Limited.
2. Z. J. Grosicki, “Watson’s Advanced Textile Design: Compound woven structures” by Woodhead Publishing Limited.
3. N. Gokarneshan, “Fabric structure and Design” by New age International Publisher.
3. S.S. Satsangi, “Saral Vastra Sangrachna” (Simple Fabric Structure – in Hindi) by M/S Usha Publishers, Shalimar Bagh, Delhi-8

SUGGESTED WEBSITES

1. https://www.youtube.com/channel/UCnPu8vcBvMdV5wtPTxC4uLA
2. https://textilelearner.net/what-is-textile-basic-textiles/

INSTRUCTIONAL STRATEGY

This is a skill based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills in the students. This subject contains five units of equal weight age with hands on practice.

2.4 DYEING AND PRE-TREATMENTS

L	P
3	4

RATIONALE

A Textile Technology Diploma holder should know the various types of processes involved in converting a grey fabric into a dyed or a fully white fabric. This subject is included to provide requisite knowledge and skill about various processing of textile machineries used to convert grey fabric into dyed fabric.

COURSE OUTCOMES

After undergoing the subject, students will be able to:

CO1: Study about various textile wet treatments, singeing, desizing, scouring

CO2: Learn about scouring, bleaching and mercerization.

CO3: Summarize dyeing, various terms and cotton dyeing.

CO4: Describe about wool, silk and acrylic dyeing.

CO5: Carry out dyeing of polyester.

DETAILED CONTENTS

UNIT I

Introduction

Introduction **t**o textile wet processing.

Natural and added impurities in cotton, wool, silk.

Singeing, Desizing and Scouring- principle and process.

Degumming of silk, bleaching of silk with hydrogen peroxide.

Bleaching of cotton with Sodium bleaching powder, hypochlorite and hydrogen peroxide.

Scouring and carbonization of wool, bleaching of wool with sodium hypochlorite and hydrogen peroxide.

Mercerization of cotton- Physical and chemical changes during process

UNIT II

Scouring and bleaching, mercerization

Scouring and bleaching of Polyamides, Polyester, Acrylic, Viscose rayon, Mercerization of cotton- Physical and chemical changes during process.

UNIT III

Introduction to Dyeing

Classification of dyes, General terms used in dyeing, Principle of dyeing.
Dyeing of cotton with- Direct dyes, Reactive dyes, Sulphur dyes, Vat dyes.

UNIT IV

Dyeing of wool, silk, acrylic

Dyeing of wool with- Acid dyes, Metal complex dyes.
Dyeing of silk with- Acid dyes, Basic dyes.
Dyeing of acrylic with basic dyes.

UNIT V

Dyeing of polyester

Dyeing of polyester with disperse dyes using- Carrier method, High temperature method
Basic machinery used in dyeing- jigger, winch, padding mangle, fiber dyeing and hank dyeing, machine-principle and working

PRACTICAL EXERCISES

1. Desizing of cotton with rot steep, acid steep and enzymes
2. Scouring of cotton.
3. Bleaching of cotton with suitable agent.
4. Bleaching of wool.
5. Bleaching of silk.
6. Scouring and bleaching of polyester.
7. Dyeing of cotton with Direct and Reactive dyes.
8. Dyeing of cotton with Sulphur and Vat dyes.
9. Dyeing of wool with Acid dyes
10. Dyeing of wool with Metal complex dyes.
11. Dyeing of silk with Acid dyes.
12. Dyeing of silk with basic dyes.
13. Dyeing of polyester with disperse dyes.

14. Dyeing of acrylic with basic dyes.
15. Visit of dyeing unit for working of various dyeing machines i.e. jigger, winch and fibre dyeing machine.

RECOMMENDED BOOKS

1. Technology of Bleaching by Dr. V.A.Shanai,Sevak Publications Mumbai (1984)
2. Textile Bleaching by Rajesh Kalra, Abhishek Publications Chandigarh (2011)
3. Technology of Dyeing by Dr. V.A.Shanai, Sevak Publications Mumbai (1996)
4. Technology of Printing by Dr. V.A.Shanai, Sevak Publications Mumbai (1985)
5. Technology of Finishing by Dr. V.A.ShanaiSevak Publications Mumbai
6. Textile science by E.P.G. Gohl and L.D. Vilensky.

SUGGESTED WEBSITES

1. https://textilelearner.net/what-is-textile-basic-textiles/
2. https://textilestudycenter.com/pre-treatment-before-dyeing/

INSTRUCTIONAL STRATEGY

This is a skill based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills in the students. This subject contains five units of equal weight age with hands on practice.

2.5 FUNDAMENTALS OF IT

L	P
2	4

RATIONALE

Information technology has great influence on all aspects of life. Almost all work places and living environment are being computerized. In order to prepare diploma holders to work in these environments, it is essential that they are exposed to various aspects of information technology such as understanding the concepts of information technology and its scope, operating a computer: use of various office management tools, using internet and mobile applications etc. This course is intended to make new students comfortable with computing environment - Learning basic computer skills, learning basic application software tools, Understanding Computer Hardware and Cyber security awareness.

COURSE OUTCOMES

At the end of the course student will be able to

- Understand the basic components of Computers, Internet and issues of abuses/ attacks on information and computers.
- Use comfortably Computer, Laptop, Mobiles, Internet Utilities and Install / Configure OS.
- Assemble a PC and connect it to external devices.
- Work with Office Practiced Automation Tools.
- Create worksheets and Prepare presentations.

DETAILED CONTENTS

UNIT I

Basics of Computer

Brief history of development of computers, Definition of Computer, Block diagram of a Computer, Hardware, Software, Booting: Cold and Hot Booting, Interaction between the CPU and Memory with Input/Output devices, Function of CPU and major functional parts of CPU.

Memory, Bit, Nibble, Byte, KB, MB, GB, TB, PB, Functions of memory, Use of storage devices in a Computer, List types of memory used in a Computer, Importance of cache memory, CPU speed and CPU word length

UNIT II

Basic Internet Skills

Understanding browser, Introduction to WWW, efficient use of search engines, awareness about Digital India portals (state and national portals) and college portals. Advantages of Email, Various email service providers, Creation of email id, sending and receiving emails, attaching documents with email and drive.

Effective use of Gmail, G-Drive, Google Calendar, Google Sites, Google Sheets, Online mode of communication using Google Meet & WebEx.

UNIT III

Basic Logic building

Introduction to Programming, Steps involved in problem solving, Definition of Algorithm, Definition of Flowchart, Steps involved in algorithm development, differentiate algorithm and flowchart, symbols used in flowcharts, algorithms for simple problems, flowcharts for simple problems, Practice logic building using flowchart/algorithms

UNIT IV

Office Tools

Office Tools like LibreOffice/OpenOffice/MSOffice.

OpenOffice Writer – Typesetting Text and Basic Formatting, Inserting Images, Hyperlinks, Bookmarks, Tables and Table Properties in Writer.

Introducing LibreOffice/OpenOffice *Calc*, Working .with Cells, Sheets, data, tables, using formulae and functions, using charts and graphics.

OpenOffice Impress – Creating and Viewing Presentations, Inserting Pictures and Tables, Slide Master and Slide Design, Custom Animation.

UNIT V

Use of Social Media

Introduction to Digital Marketing – Why Digital Marketing, Characteristics of Digital Marketing, Tools for Digital Marketing, , Effective use of Social Media like LinkedIn, Google+, Facebook, Twitter, etc.: Features of Social media, Advantages and Disadvantages of Social Media.

PRACTICAL EXERCISES

This Lab course is intended to practice whatever is taught in theory class of 'Fundamentals of Information Technology' and become proficient in using computing environment - basic

computer skills, basic application software tools, Computer Hardware, basic logic building exercise, basic use of emails in daily life etc.

1. Browser features, browsing, using various search engines, writing search queries
2. Visit various e-governance/Digital India portals, understand their features, services offered
3. Read Wikipedia pages on computer hardware components, look at those components in lab, identify them, recognize various ports/interfaces and related cables, etc.
4. Using Administrative Tools/Control Panel Settings of Operating Systems
5. Connect various peripherals (printer, scanner, etc.) to computer, explore various features of peripheral and their device driver software.
6. Explore features of Open Office tools and MS-Office, create documents, create presentation, create spread sheet, using these features, do it multiple times
7. Working with Conversion Software like pdfToWord, WordToPPT, etc.
8. Working with Mobile Applications – Searching for Authentic Mobile app, Installation and Settings, Govt. of India Mobile Applications
9. Creating email id, sending and receiving mails with attachments.
10. Using Google drive, Google calendar
11. Create Flow chart and Algorithm for the following

i. Addition of n numbers and display result
ii. To convert temperature from Celsius to Fahrenheit
iii. To find Area and Perimeter of Square
iv. Swap Two Numbers
v. find the smallest of two numbers
vi. Find whether given number is Even or Odd
vii. To print first n even Numbers
viii. find sum of series 1+2+3+…..+N
ix. print multiplication Table of a number
x. generate first n Fibonacci terms 0,1,1,2,3,5…n (n>2)
xi. sum and average of given series of numbers
xii. Factorial of number n (n!=1x2x3x…n)
xiii. Armstrong Number
xiv. Find whether given number is Prime or not

RECOMMENDED BOOKS

1. R.S. Salaria, Computer Fundamentals, Khanna Publishing House
2. Ramesh Bangia, PC Software Made Easy – The PC Course Kit, Khanna Publishing House

3. Online Resources, Linux man pages, Wikipedia
4. Mastering Linux Shell Scripting: A practical guide to Linux command-line, Bash scripting, and Shell programming, by Mokhtar Ebrahim, Andrew Mallett
5. Vikas Gupta (2008), Comdex Hardware and Networking Course Kit, DreamTech press, New Delhi, India.
6. Sumitabha Das (2008), UNIX concepts and applications, 4th Edition, Tata McGraw Hill, New Delhi, India.

SUGGESTED WEBSITES / SOFTWARES

1. https://nptel.ac.in/courses/106/106/106106222/ - NPTEL Course on Modern Application Development
2. https://onlinecourses.swayam2.ac.in/aic19_de01/preview -
3. https://spoken-tutorial.org/ - Tutorials on Introduction to Computers, HTML, LibreOffice Tools, etc.
4. NOTEPAD++
5. https://tms-outsource.com/blog/posts/web-development-ide/

INSTRUCTIONAL STRATEGY

This is hands on practice based subject and topics taught in the class should be practiced in the lab regularly for development of required skills in the students. This subject contains five units of equal weight age.

SECOND YEAR

NSQF LEVEL - 4

12. STUDY AND EVALUATION SCHEME

THIRD SEMESTER

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week		Credits L+P= C	MARKS IN EVALUATION SCHEME						Total Marks of Internal & External
					INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	P		Th	Pr	Total	Th	Pr	Total	
3.1	Industrial/In-House Training - I	-	2	0+1=1	-	40	40	-	60	60	100
3.2	Spinning Technology - I	3	4	3+2=5	40	40	80	60	60	120	200
3.3	Weaving Technology - I	3	4	3+2=5	40	40	80	60	60	120	200
3.4	Knitting Technology	3	4	3+2=5	40	40	80	60	60	120	200
3.5	Textile Printing and Finishing	3	4	3+2=5	40	40	80	60	60	120	200
3.6	Multidisciplinary Elective (MOOCs^{+}/Offline)	2	-	2+0=2	40	-	40	60	-	60	100
	# SCA	-	3	-	-	-	-	-	-	-	-
	Total	**14**	**21**	**23**	**200**	**200**	**400**	**300**	**300**	**600**	**1000**

\+ Assessment of Multidisciplinary Elective through MOOCs shall be based on assignments out of 100 marks.

\# Student Centered Activities will comprise of co-curricular activities like extension lectures on Constitution of India, Electoral Literacy, Motor Vehicles (Driving) Regulations 2017 etc., games, hobby clubs e.g. photography etc., seminars, declamation contests, educational field visits, N.C.C., NSS, Cultural Activities and self-study etc.

FOURTH SEMESTER

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week		Credits (C) L + P = C	MARKS IN EVALUATION SCHEME						Total Marks of Internal & External
					INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	P		Th	Pr	Total	Th	Pr	Total	
4.1	*English and Communication Skills - II	2	2	**2+1=3**	40	40	80	60	60	120	200
4.2	Spinning Technology-II	3	4	**3+2=5**	40	40	80	60	60	120	200
4.3	Weaving Technology-II	3	4	**3+2=5**	40	40	80	60	60	120	200
4.4	Textile Testing - I	3	4	**3+2=5**	40	40	80	60	60	120	200
4.5	Minor Project	-	8	**0+4=4**	-	40	40	-	60	60	100
# Student Centered Activities (SCA)		-	2	**-**	-	-	-	-	-	-	-
Total		**11**	**24**	**22**	**160**	**200**	**360**	**240**	**300**	**540**	**900**

* Common with other Diploma Courses.

\# Student Centered Activities will comprise of co-curricular activities like extension lectures on Constitution of India, Electoral Literacy, Motor Vehicles (Driving) Regulations 2017 etc., games, hobby clubs e.g. photography etc., seminars, declamation contests, educational field visits, N.C.C., NSS, Cultural Activities and self-study etc.

Industrial Training: After 4th Semester, students shall undergo Industrial Training of 4 Weeks.

13. HORIZONTAL AND VERTICAL SUBJECTS ORGANISATION

Sr. No.	Subjects/Areas	Hours Per Week	
		Third Semester	Fourth Semester
1.	Industrial/In-House Training - I	2	-
2.	Spinning Technology - I	7	-
3.	Weaving Technology - I	7	-
4.	Knitting Technology	7	-
5.	Textile Printing and Finishing	7	-
6.	Multidisciplinary Elective (MOOCs/Offline)	2	-
7.	English and Communication Skills - II	-	4
8.	Spinning Technology-II	-	7
9.	Weaving Technology-II	-	7
10.	Textile Testing - I	-	7
11.	Minor Project	-	8
12.	Student Centered Activities	3	2
	Total	**35**	**35**

14. COMPETENCY PROFILE & EMPLOYMENT OPPORTUNITIES

Government and private sectors related to **Textile Technology** require **skilled employees** to work in familiar, predictable, routine situations of clear choice. They are expected to have factual knowledge of textile technology field. They are expected to communicate with required clarity. Students after completing level 4 shall have knowledge of basic arithmetic, algebraic principles and basic understanding of social and natural environment. They are expected to recall and demonstrate skills in narrow range of applications using appropriate rules and tools to maintain quality.

Skilled workers will be responsible for carrying out a range of jobs, some of which will require them to make choices about the approaches they adopt. They will be expected to learn and improve their practice on the job. They should know what constitutes quality in the occupation and should distinguish between good and bad quality in the context of their job roles. Skilled employee at this level will be expected to carry out their work safely and securely and take full account of the health and safety on colleagues and customers. They should work hygienically and in ways which show an understanding of environmental issues. In working with others, they will be expected to conduct themselves in ways which show a basic understanding of the social and political environment.

Textile Technology NSQF Level – 4 pass out students should have good theoretical and hands-on experience in spinning technology, weaving technology, knitting technology, textile printing and textile finishing along with its effective application in garment industries. They are also expected ti demonstrate good practical skills in textile testing and quality control. Students at this level are also expected to handle small projects related to textile and garment industries.

Textile Technology students have wide scope to work in textile mills, processing houses, garment export houses, weaving mills, textile testing houses, fabric quality control centers and production units in garment manufacturing industries. They can also start their own small startups in the area of marketing, sales, manufacturing and production etc.

15. PROGRAMME OUTCOMES

The programme outcomes are derived from five domains of NSQF Level – 4 namely Process, Professional Knowledge, Professional Skill, Core Skill, Responsibility. After completing this level, the student will be able to:

PO1: Work in familiar, predictable, routine situation of clear choice.

PO2: Acquire factual knowledge in the textile technology for employment.

PO3: Demonstrate routine and repetitive skills in narrow range of applications using appropriate rules and tools for quality.

PO4: Communicate with required clarity along with social and natural environment understanding.

PO5: Perform tasks with responsibility for own work and learning.

PO6: Select multidisciplinary elective of own interest to develop self-learning habit through online courses.

16. ASSESSMENT OF PROGRAMME AND COURSE OUTCOMES

Programme Outcomes to be assessed	Assessment criteria for the Course Outcomes
PO1: Work in familiar, predictable, routine situation of clear choice.	• Calculate blow room cleaning efficiency, waste percentage and cost. • Describe grinding and handle maintenance schedule in carding. • Differentiate various types of loom shedding. • Classify different type of weft insertion methods. • Differentiate various types of weft knitting machines, knitting stitches and knitting fabrics. • Recognize knitted fabrics defects and rectify them. • Calculate the production of machine. • Handle manufacturing process of different types of hose. • Handle various finishes for textile material. • Describe and conduct various mechanical and chemical finishes. • Calculate draft and production of Draw Frame. • Describe the speed frame i.e. passage, gearing, drafting and production. • Identify faults in dobby weaving. • Classify Jacquards and differentiate Jacquard weaving with dobby and tappet weaving. • Calculate the production and efficiency of dobby and jacquard looms. • Handle various instruments used in fiber testing. • Test yarn using various mechanical and electronic instruments.
PO2: Acquire factual knowledge in the field of textile technology for employment	• Study about ginning, mixing and blending. • Learn about various opening, cleaning and beating machine. • Acquire knowledge about the working of carding machine.

	• Learn primary and secondary motions of loom. • Explain fell of the cloth joining with weft. • Justify continuous movement of the warp sheet. • Describe different types of weft knitted fabric derivatives. • Learn about various styles and methods of printing. • Study and perform after treatments. • Explain various types of special finishes. • Learn about the Draw Frame and its purpose. • Acquire knowledge about the sliver lap machine. • Explain autoleveller and latest Draw Frame machines. • Learn different kind of dobby mechanism. • Describe the construction and working of various types of Jacquard. • Learn about various fiber testing requirements. • Describe at various stages of testing in yarn processes. • Compare the actual and standards of yarn quality parameters.
PO3: Demonstrate routine and repetitive skills in narrow range of applications using appropriate rules and tools for quality.	• Calculate blow room cleaning efficiency, waste percentage and cost. • Describe grinding and handle maintenance schedule in carding. • Differentiate various types of loom shedding. • Classify different type of weft insertion methods. • Differentiate various types of weft knitting machines, knitting stitches and knitting fabrics. • Recognize knitted fabrics defects and rectify them. • Calculate the production of machine. • Handle manufacturing process of different types of hose. • Handle various finishes for textile material. • Describe and conduct various mechanical and

	chemical finishes. • Calculate draft and production of Draw Frame. • Describe the speed frame i.e. passage, gearing, drafting and production. • Identify faults in dobby weaving. • Classify Jacquards and differentiate Jacquard weaving with dobby and tappet weaving. • Calculate the production and efficiency of dobby and jacquard looms. • Handle various instruments used in fiber testing. • Test yarn using various mechanical and electronic instruments.
PO4: Communicate with required clarity along with social and natural environment understanding.	• Develop required competencies for effective communication and presentation. • Communicate effectively with an increased confidence; read, write and speak in English language fluently. • Comprehend special features of format and style of formal communication through various modes. • Write a Report, Resume, make a Presentation, Participate in GDs and Face Interviews • Illustrate use of communication to build a positive self-image through self-expression and develop more productive interpersonal relationships. • Write the minor project report effectively. • Present the minor project report using PPT.
PO5: Perform tasks with responsibility for own work and learning.	• Understand the working environment of industries. • Take necessary safety precautions and measures. • Learn about present and future requirement of industries. • Work in team for solving industrial problems. • Develop required competencies and skills for relevant industries. • Select the minor project according to the need of relevant industries.

	• Work as a team member for successful completion of minor project. • Acquire Life Long Learning skills.
PO6: Select multidisciplinary elective of own interest to develop self-learning habit through online courses.	• Apply critical thinking problem solving. • Demonstrate self and time management. • Display analytical and research abilities. • Integrate multiple knowledge domains. • Enhance the scope and depth of learning.

17. SUBJECTS & CONTENTS

(SECOND YEAR)

THIRD SEMESTER

3.1 INDUSTRIAL / IN – HOUSE TRAINING - I

L	P
-	2

RATIONALE

Industrial training / In – house training will help the students to understand the working environment of relevant industries. The student will learn to work in team to solve the industrial problems. It will also give exposure about the present and future requirements of the relevant industries. This training is very important for development of required competencies and skills for employment and start– ups.

COURSE OUTCOMES

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

CO1: Understand the working environment of industries
CO2: Take necessary safety precautions and measures.
CO3: Learn about present and future requirement of industries.
CO4: Work in team for solving industrial problems
CO5: Develop competencies and skills required by relevant industries.
CO6: Develop writing, speaking and presentations skills.

PRACTICAL EXERCISES

1. Report writing based on industrial training.
2. Preparation of Power Point Slides based on industrial training and presentation by the candidate.
3. Internal Evaluation based on quality of Report, PPT preparation, PPT presentation and answer to queries.
4. External Evaluation based on quality of Report, PPT preparation, PPT presentation and answer to queries.

GUIDELINES

Students will be evaluated based on Industrial training / In – house training report and their presentation using Power Point about the knowledge and skills gained during the training. The Head of the Department will depute faculty coordinators by assigning a group of students to each. The coordinators will mentor and guide the students in preparing the PPTs for final presentation. The following performance parameters are to be considered for assessment of the students out of 100 marks:

	Parameter	**Weightage**
i	Industrial / In-house assessment of the candidate by the trainer	40%
ii	Report Writing	20%
iii	Power Point Presentation	20%
iv	Viva-voce	20%

3.2 SPINNING TECHNOLOGY - I

L	P
3	4

RATIONALE

Textile technology students after completing this level have to work in Spinning mills, textile houses and quality control centres. They are expected to have knowledge of fiber opening and cleaning. Therefore, they should know the basic principles and objects of Ginning, Blow Room and Carding Machines. They are also expected to have exposure about working, quality and production calculation of Blow Room and Carding Machines.

COURSE OUTCOMES

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

CO1: Study about ginning, mixing and blending.

CO2: Learn about various opening, cleaning and beating machine.

CO3: Calculate blow room cleaning efficiency, waste percentage and cost.

CO4: Acquire knowledge about the working of carding machine.

CO5: Describe grinding and handle maintenance schedule in carding.

DETAILED CONTENTS

UNIT I

Ginning, Mixing, Blending

Objects of ginning. To study saw ginning. Object and importance of sorting. Importance and objects of mixing. Importance and objects of blending. Mixing techniques in Blow Room. Ingredients used in mixing and their standard limit. Blending techniques from Blow Room to Draw frame. Comparison of mixing and blending.

UNIT II

Principles of opening, cleaning, and other principles used in Blow Room

Types of feed (Loose, semi fast and fast feed). Difference between beating and opening. Type of beaters. Type of spikes, nails, beaters used in Blow room. Type of waste extraction systems in Blow

room. Principle of dust, dirt and fly extraction. Types of outlet of blow room and carding machines. Types of trumpet and principle of using it as per material used and hank. Principle of air currents. Multifunctional Separator and by pass arrangement. Description and working of Condenser.

UNIT III

Blow room

Objects of Bolw room. Study of following machines: Automatic Bale Plucker, Mixing bale opener/Hopper bale breaker B2/2 and B3/4R, step cleaner, mono cylinder cleaner, Axi Flow, Unimix and Method of Unimix mixing, ERM Cleaner, Chute Feed System, Necessity & working of Chute Feed System at Blow Room. Principle of feed regulating motion - weight, photo sensor and fast feed in relation to ERM cleaner and chute feed system. Use of machines for cotton or MMF. Main features of Modern Blow Room Line.

UNIT IV

Carding

Objects of carding. Passage of material through Revolving Flat Card. Functions, size, speed of various parts i.e. licker-in, mote knives, undercasing, back plate, front plate, cylinder, flats, Stationary flats doffer, trumpet, can and coil, Types and specifications of wires used in Licker in, cylinder and doffer. Difference between carding action and stripping action, Flexible and metallic card clothing, advantages of metallic card clothing. Objects of stripping, procedure for Plain Roller stripping, Objects of grinding and Types of Grinding. Autoleveller, types of autoleveller and functioning. Principle of waste extraction Card wastes, its type, standards and control, e.g. motes, fly, strips, dropping, flat waste. Neps and remedies to control neps, Defects in card web and their removal. Latest development in Carding machine. Salient features of High Production Cards LC-300, DK-840, C 70, LC 333 and LC 363.

UNIT V

Calculations

Blow room waste and its types. Calculation of waste percentage and cleaning efficiency of blow room and card. Material realization. Calculation of draft and draft constant, tension draft and its constant. Production of card and calculation of waste percentage of a card, cleaning efficiency of Card. Production Constant.

PRACTICAL EXERCISES

1. Practically sketch and describe the passage of material through condenser.
2. Practically sketch and describe the passage of material through Automatic Bale Opener/Plucker.
3. Practically sketch and describe the passage of material through Multifunctional separator. Multimixer, Cleanomat.
4. To sketch and understand the working of MBO and ERM cleaner.
5. Practically study of the Chute Feed System, electronic feed regulating system.
6. To study the different type of wastes and their control in blow room.
7. Maintenance schedule of Blow Room line, Lubrication and overhauling of blow room.
8. Demonstrate the passage of material through the machine and to introduce with different parts of Revolving Flat Card.
9. To study size and practice the setting and gauging between different parts of Card Machine.
10. To Calculate drafts between various parts of carding machine (total draft, draft constant, tension draft. and tension draft constant).
11. Calculate production constant and production of Card.
12. To study of auto doffing mechanism in carding.
13. To understand maintenance schedule and lubrication in carding.
14. To know Humidification plant function, process flow and role of temperature/RH% in different type of fibers through spinning mill visit.
15. Process control Parameter in Blow Room and carding.
16. To study about microprocessor control, limit switch, stop motions and differential motors in blow room.

RECOMMENDED BOOKS

1. Venkatasubramani, “Spun Yarn Technology”, Vol.1, by Saravana Publication (1985)
2. Gilbert R merril, “Cotton Opening and Picking”, by MPCM (1954).
3. “Manual of Cotton Spinning”, Vol.-II and part-I, Textile Institute Butterworths, London (1966).
4. Zoltan S Szaloki, “Opening, Cleaning and Picking” by Institute of Textile Technology (1976).

5. T.K. Pattabhiram, "Essential Elements of Practical Cotton Spinning" by, Somaiya Publication (1997).
6. W Klein, "A practical Guide to Short Staple spinning" by The Textile Institute Publication, 1998.
7. WS Taggart, "Cotton Spinning" by, Bombay, Universal book Corporation (1979).
8. WS Taggart, "Cotton Spinning Calculations by, Published by Macmillan and Co., Limited, London, 1939.
9. Pattabhiram, "Essential Calculations on practical Cotton Spinning" by Samainy Pub, Mumbai, (1997) 5th edition.
10. A.F.W. and Dakin G, "Doubled Yarn" parts I to V by Coulson.
11. Sharma, Aggarwal, "Blowroom, DK740 Card", NITRA.

RECOMMENDED WEBSITES

1. http://swayam.gov.in
2. https://www.youtube.com/channel/UCnPu8vcBvMdV5wtPTxC4uLA
3. https://textilelearner.net/what-is-textile-basic-textiles/
4. https://textilestudycenter.com/

INSTRUCTIONAL STRATEGY

This is hands on practice based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills in the students. This subject contains five units of equal weight age.

3.3 WEAVING TECHNOLOGY - I

L	P
3	4

RATIONALE

Textile technology students are placed in weaving industry, fabric testing and relevant fields. In weaving, they need to know about loom and its motions. The subject will impart awareness about different parts of loom. This subject deals with primary and secondary motions of loom to produce the good quality of fabric.

COURSE OUTCOMES

After undergoing this subject, the students will be able to:
CO1: Learn primary and secondary motions of loom.
CO2: Differentiate various types of loom shedding.
CO3: Classify different type of weft insertion methods.
CO4: Explain fell of the cloth joining with weft.
CO5: Justify continuous movement of the warp sheet.

DETAILED CONTENTS

UNIT I
General introduction to weaving

History of weaving. Terminology regarding winding and loom – Yarn, Warp, Weft, Weaving, Fabric, Selvedge, Loom, EPI, PPI, PPM.
Introduction to handloom and Power loom. Classification of Looms. Classifications of loom motion. Primary, Secondary and Auxiliary motions.

UNIT II
Shedding

Introduction to different types of Heald/Heddles, reeds. Shuttles and its types. Shedding introduction. Types of sheds. Merits and demerits of different types of sheds. Working of tappet shedding mechanism.

UNIT III
Picking

Introduction to picking Mechanism. Study and adjustment of picking mechanism for over pick motion. Study and Adjustment of Mechanism for under pick motion. Merits and demerits of under pick and over pick motion. Causes of shuttle flying out and trapping and remedies thereof.

UNIT IV
Beating up Motion:

Objectives of Beat up. Mechanism of beating up motion. Eccentricity of slay. Importance of Eccentricity. Methods of finding eccentricity of slay. Factors effecting eccentricity of slay.

UNIT V
Secondary Motions

Take up motion: Objectives of take up motions, various types of take up motions. Working of 7 wheel take up motion. Working of Continuous take up motion.

Let off Motion: Objectives of let off motion various types of let off motion. Study of various parts and the working of positive let off motion.

PRACTICAL EXERCISES

1. Precautions to be observed during working on loom
2. Draw the Passage of material through Loom.
3. Draw the Parts of Conventional Loom – Weavers Beam, Back rest, Lease rods, Heald/Heddles Frame, Reed, Front rest, Cloth roller, Treadle.
4. Draw the Heald reversing motion.
5. Draw the Timing of shedding motion. Early and late shedding.
6. Calculations regarding Heald/Heddles and Reed count.
7. Study and Adjustment of picking mechanism for over pick motion.
8. Study and Adjustment of Mechanism for under pick Motion.
9. Varying the intensity of picking with relation to velocity of shuttle.
10. Timing of picking motion. Early and late picking.
11. Different methods to calculate the reed count. Identification of different types of reeds
12. Dismantling and resetting the beating up Mechanism

13. Concept of Standard Wheel, Change Wheel, Ratchet wheel and dividend of 7 wheel take up motion.
14. Calculations in take up motion for inserting specific number of picks/unit space.
15. Sketching various parts of negative let off motion on the loom.

RECOMMENDED BOOKS

1. Marinal Kanti Talukdar, P. K. Sriramulu, Dinkar Bapurao Ajgaonkar, "Weaving machines, mechanisms and management" by. Mahajan Publisher Ahamdabad 1998.
2. Weaving Mechanism Vol I and II by N.N. Banerjee. Textile Book House, West Bangal. 1982.
3. Sorabji M. Rutnagur Shutteless Weaving Mechanism-Bombay Textile Research Association, 2007.
4. T.W. Fox, "Weaving Mechanism" by Macmillan and Company, 2005.
5. Abhijit Majumdar , "Principles of Woven Fabric Manufacturing" by CRC Press 2016.
6. Sen Gupta, "Weaving Calculation" by D.B. Taraporevala Sons, 1981.
7. Kishar, "Weaving Technology in India" by
8. S.S Satsangi, "Jacquard Ek Saral Vidya" (in Hindi and English both) by M/s Usha Publishers (SBB/AC-IV Shalimar Building Delhi-88
9. S.S. Satsangi, "Saral Vastra Sangrachna" (Simple Fabric Structure – in Hindi) by M/S Usha Publishers, Shalimar Bagh, Delhi-88
10. K.T. Ashwani, "Plain Weaving Motion" by Abhisek Publication Ltd. Chandigarh.
11. Weaving Calculations by FB&C Limited. Creative Media Partners, LLC, (2016).
12. R Marks and ATC Robbinson, "Principals of Weaving" Textile Institute, (1976).
13. Sabit Adanur, "Handbook of Weaving" CRC Press 2019.

RECOMMENDED WEBSITES

1. https://textilelearner.net/what-is-textile-basic-textiles/
2. https://textilestudycenter.com/
3. http://swayam.gov.in

INSTRUCTIONAL STRATEGY

This is hands on practice based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills in the students. This subject contains five units of equal weight age.

3.4 KNITTING TECHNOLOGY

L	P
3	4

RATIONALE

Textile technology students at this level needs to know about different types of knitting machines and their parts. They should have knowledge of different types of knitted loops, stitches, their advantages and disadvantages. They are also expected to have good exposure of formation of different types of knitted fabrics, their derivatives and designs.

COURSE OUTCOMES

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

CO1: Differentiate various types of weft knitting machines, knitting stitches and knitting fabrics.

CO2: Describe different types of weft knitted fabric derivatives.

CO3: Recognize knitted fabrics defects and rectify them.

CO4: Calculate the production of machine.

CO5: Handle manufacturing process of different types of hose.

DETAILED CONTENTS

UNIT I

Introduction to Knitting Process

Definitions- Knitting, course ,wale, loop, weft knitting, warp knitting, , stitch, stitch length, stitch density, single jersey fabric, double jersey fabric, yarn liner density, GSM, Gauges, stitch density, cams, plating, racking , laying- in, long and short butt needles.

Comparison of weaving with Knitted fabric in relation to yarn, feed material, preparatory processes, industry structure, machines, fabric properties, end use, labor, maintenance, cost effectiveness. Comparison of weft and warp knitting.

UNIT II

Weft Knitting Machines

Introduction and classification, Knitting Elements. Needles and its types. Parts of latch needle, spring bearded needle and compound needle. Their advantages and disadvantages. Knitting cycles of latch needle, spring bearded needle and compound needle.

Basic shapes of wire butt and flat stock latch needle. Sinker- function, shapes, detailed description. Cams and general description of cam. Passage of material through flat bed knitting machine. Passage of material through circular knitting machine.

UNIT III

Weft Knit Fabric Stitches

Knitted fabric representation – verbal, symbolic, diagrammatic, graphical. Knit, tuck and float stitch –Representation, characteristics and uses. Special Stitch- Laying-in, Plating, Openwork Structures.

UNIT IV

Type of Knitted Fabric

Plain knitted fabric – knitting cycles, characteristics, ornamentation, derivatives and its end uses. Rib knitted fabric – characteristics, derivatives and its end uses. Interlock knitted fabric – characteristics, ornamentation, derivatives and its end uses. Purl knitted fabric – knitting cycles, characteristics, ornamentation, derivatives and its end uses.

UNIT V

Hosiery

Hose, half hose, manufacturing process of hose. Modification in heel and toe: Y-heel, gussest toe, scotch heel.

Calculation

Calculation related to production, weight per linear yard, no. of needles required, width of fabrics. Quality requirements of knitted yarn. Faults in knitted fabrics.

PRACTICAL EXERCISES

1. To study Yarn parameters for hosiery yarn.
2. To study Parts and knitting cycle of latch needle.
3. To introduce terms for single and double hook latch needle according to ISO. Classification of cross section of hook, hook position, hook shapes, latch shapes, latch fit and butt shapes.
4. To study Sinker shape, functions, and have detailed description of its part.
5. To construct Sinker for plain, plush and fleece.
6. To study Cams (needle sinker control unit) and its type (sliding cam, flexible cam, changeable cam).
7. To study rib setting of cylinder and dial with synchronous and delayed timing.
8. Passage of material through flat bed knitting machine with specific stress on cam system (single and double), direct and indirect yarns feed.

9. To draw cardigan stiches, racked and ribbed structure in flat bed knitting machine.
10. To study mechanically and electronically controlled flat bed jacquard knitting.
11. To study knitting cycle of flat bed purl knitting machine.
12. Passage of material through circular knitting machine.
13. To construct and develop a Plain knitted fabric.
14. To study cam arrangement and construct a rib knitted fabric or Interlock knitted fabric.
15. To study basic element and camming arrangement of garment length machine.
16. To discuss the production and development of heel and toe.
17. To discuss the production of hosiery.
18. To discuss different types of heel and toes.
19. To prepare special designs like horizontal stripping, intarsia and individual stitch selection.

RECOMMENDED BOOKS

1. D.B Ajganokar, “Knitting Technologies” by Universal Publishing Corp, Bombay.
2. Mark and Spancer, “Knitting Technology” by Woodhead Publishing Limited.
3. J.E. Booth, “Textile Mathematics Vol-III by Textile Institute Manchaster.
4. David J. Spencer, “Knitting Technology” by Woodhead Publishing Ltd., Pergamon Press
5. Iyer/Mammel/Schach, “Circular Knitting” by Meisenbach Bamberg.
6. Iyer/Mammel/Schach, “Technical dictionary for knitwear and Hosiery production” by Meisenbach Bamberg.
7. Knitted Fabric by AICTE.
8. Sunil K. Puri, “A Guide to fully fashioned sweater Manufacturing” by Woodhead Publishing India in Textiles.
9. Textile Design Principles, Advances and Applications quantity by A. Briggs et all. The textile institute UK. Woodhead Publishing India
10. Rohan Shishoo , “Textiles for Sportswear” by The textile institute UK. Woodhead Publishing India.
11. K. F. Au., Advances in Knitting Technology” by the textile institute UK. Woodhead Publishing India.
12. Computer Integrated Manufacturing and Total Quality Management (Vol. 27 No. 4). Textile Progress. The textile institute UK.

SUGGESTED WEBSITES

1. https://www.youtube.com/channel/UCnPu8vcBvMdV5wtPTxC4uLA
2. https://textilelearner.net/what-is-textile-basic-textiles/

3. https://textilestudycenter.com/
4. http://swayam.gov.in

INSTRUCTIONAL STRATEGY

This is hands on practice based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills in the students. This subject contains five units of equal weight age.

3.5 TEXTILE PRINTING AND FINISHING

L	P
3	4

RATIONALE

Textile technology students after completing this level should know the various types of processes involved in converting a white and dyed fabric into a printed and finished fabric. They are also expected to have requisite knowledge and skill about various processing of textile printing and finishing machineries to enhance fabric appearance through various printing styles and methods.

COURSE OUTCOMES

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

CO1: Learn about various styles and methods of printing.

CO2: Study and perform after treatments.

CO3: Handle various finishes for textile material.

CO4: Describe and conduct various mechanical and chemical finishes.

CO5: Explain various types of special finishes.

DETAILED CONTENTS

UNIT I

Introduction to printing

Introduction to Textile printing. Compare dyeing with printing process. Various ingredients used in printing process. Styles of printing used for textile. Comparison between styles and methods of printing.

UNIT II

Methods of printing

Block printing, screen printing, roller printing, transfer printing, and digital printing. After treatment of printing goods- Ageing, Steaming, Curing, Washing.

UNIT III

Finishes:

Introduction and Importance of finishes. Objectives of finishing. Classification of finishes and degree of permanency. Drying machines- Hydro extractor, stenter and IR dryer.

UNIT IV

Mechanical Finishes

Principle, purpose and description of various finishes. Calendaring, Heat setting/tentering, decatizing, sanforizing, sueding/peaching.

UNIT V

Chemical finishing

Principle, purpose and chemicals used for various finishes. Softening, moth proof, antimicrobial, water repellent and water proof, wash-n-wear/anti-creasing, durable press, flame retardency and flame proofing.

PRACTICAL EXERCISES

1. Printing a cotton fabric sample by screen printing method using suitable dyes/colour with single colour.
2. Printing a cotton fabric sample by screen printing method using suitable dyes/ colours with multiple colours.
3. Printing a cotton fabric sample by block printing method using suitable dyes/ colours with single colour.
4. Printing a cotton fabric sample by block printing method using suitable dyes/ colours with multiple colours.
5. Printing a cotton fabric sample by stencil printing method using suitable dyes/ colours with single colour.
6. Printing a cotton fabric sample by stencil printing method using suitable dyes/ colours with multiple colours.
7. Demonstrate working of roller printing machines.
8. Demonstrate working of curing machine.
9. Demonstrate working of rotary screen printing machine.
10. To study calendaring machine with sketch.
11. To study about sueding /peaching finishing machine.

12. To study about heat setting machine with diagramme.
13. To draw and explain passage of material through decatizing machine.
14. To draw and explain passage of material through sanforizing machine.
15. To study the working principle with diagram of cottage steamer.

RECOMMENDED BOOKS

1. R. S. Prayag, "Textile finishing" by R.S. Prayag, [India], 1994.
2. Rajesh Kalra, "Textile Bleaching" by Abhishek Publications Chandigarh (2011)
3. Dr. V.A.Shanai, "Technology of Printing" by Sevak Publications Mumbai (1985).
4. Dr. V.A.Shanai, "Technology of Finishing" by Sevak Publications Mumbai (1990).
5. R. S. Prayag, "Technology of Textile Printing" by Mrs. R. S. Prayag 127 Belgium Rd, Dharwad (1986).

RECOMMENDED WEBSITES

1. https://textilelearner.net/what-is-textile-basic-textiles/
2. https://textilestudycenter.com/
3. https://nptel.ac.in/courses/116/102/116102052/
4. http://swayam.gov.in

INSTRUCTIONAL STRATEGY

This is hands on practice based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills in the students. This subject contains five units of equal weight age.

3.6 MULTIDISCIPLINARY ELECTIVE

L	P
2	-

RATIONALE

Multidisciplinary electives are very important and play major role in implementation of National Education Policy. Multidisciplinary is a subject which is useful for two or more disciplines in which students are asked to understand the concept of multidisciplinary or interdisciplinary. It will help the students to gain an arsenal of skills that are easily transferable across work environments.

COURSE OUTCOMES

At the end of the open elective, the students will be able to:

CO1: Apply critical thinking problem solving.
CO2: Demonstrate self and time management.
CO3: Display analytical and research abilities.
CO4: Integrate multiple knowledge domains.
CO5: Enhance the scope and depth of learning.

LIST OF MULTIDISCIPLINARY ELECTIVES

(The list is indicative and not exhaustive)

1. Introduction to Internet of Things
2. Introduction to Robotics
3. Introduction to Embedded System Design
4. Fundamentals of Artificial Intelligence
5. Digital Image Processing
6. Introduction to Machine Learning
7. Fundamentals of Artificial Intelligence
8. The Joy of Computing Using Python
9. Cloud Computing
10. Introduction to Industry 4.0
11. Industrial Internet of Things

12. Object Oriented System Development using UML, Java and Patterns

GUIDELINES

Multidisciplinary Elective shall be offered preferably in online mode. Online mode multidisciplinary elective shall preferably be through Massive Open Online Courses (MOOCs) from Swayam, NPTEL, Upgrad, Udemy, Khan Academy or any other online portal to promote self-learning. A flexible basket of large number of multidisciplinary electives is suggested which can be modified depending upon the availability of courses at suggested portals and requirements. For online multidisciplinary electives, department coordinators shall be assigned to monitor and guide the group of students for selection of minimum 20 hours duration online course of their choice. For offline multidisciplinary electives, a suitable relevant subject shall be offered by the respective department to the students with minimum 40% of the total class strength as per present and future requirements.

Assessment of MOOCs multidisciplinary elective shall be based on continuous evaluation by the respective coordinator. The coordinator shall consider the submitted assignments by the students from time to time during the conduct of MOOCs. The MOOCs assessment shall be conducted by the coordinator along with one external expert by considering submitted assignments out of 100 marks.

In case, no suitable multidisciplinary elective is available online, only then the course may be conducted in offline mode. The assessment of offline multidisciplinary elective shall be internal and external. The offline multidisciplinary elective internal assessment of 40 marks shall be based on internal sessional tests, assignments etc. and external assessment of 60 marks shall be based on external examination at institute level.

SUGGESTED WEBSITES

1. https://swayam.gov.in/
2. https://www.udemy.com/
3. https://www.upgrad.com/
4. https://www.khanacademy.org/

FOURTH SEMESTER

4.1 ENGLISH AND COMMUNICATION SKILL - II

L	P
2	2

RATIONALE

Communication II moves a step further from Communication Skills I and is aimed at enhancing the linguistic competency of the students. Language as the most commonly used medium of self-expression remains indispensable in all spheres of human life – personal, social and professional. This course is intended to make fresh ground in teaching of Communicative English as per the requirements of National Skill Quality Framework.

COURSE OUTCOMES

After undergoing this course, the learners will be able to:

CO1: Communicate effectively with an increased confidence; read, write and speak in English language fluently.

CO2: Comprehend special features of format and style of formal communication through various modes.

CO3: Write a Report, Resume, make a Presentation, Participate in GDs and Face Interviews

CO4: Illustrate use of communication to build a positive self-image through self-expression and develop more productive interpersonal relationships.

DETAILED CONTENTS

UNIT I

Reading

1.1 Portrait of a Lady - Khushwant Singh

1.2 The Doctor's Word by R K Narayan

1.3 Speech by Dr Kiran Bedi at IIM Indore2007 Leadership Concepts

1.4 The Bet - by Anton Chekov

UNIT II

Effective Communication Skills

2.1 Modern means of Communication (Video Conferencing, e- mail, Teleconferencing)

2.2 Effective Communication Skills: 7 C's of Communication
2.3 Non-verbal Communication – Significance, Types and Techniques for Effective Communication
2.4 Barriers and Effectiveness in Listening Skills
2.5 Barriers and Effectiveness in Speaking Skills

Unit III

Professional Writing

3.1 Correspondence: Enquiry letters, placing orders, complaint letters
3.2 Report Writing
3.3 Memos
3.4 Circulars
3.5 Press Release
3.6 Inspection Notes and tips for Note-taking
3.7 Corrigendum writing
3.8 Cover Letter

UNIT IV

Grammar and Vocabulary

4.1 Prepositions
4.2 Conjunctions
4.3 Punctuation
4.4 Idioms and Phrases: A bird of ill omen, A bird's eye view, A burning question, A child's play, A cat and dog life, A feather in one's cap, A fish out of water, A shark, A snail's pace, A snake in the grass, A wild goose chase, As busy as a bee, As faithful as dog, Apple of One's eye, Behind one's back, Breath one's last, Below the belt, Beat about the bush, Birds of a feather flock together, Black Sheep, Blue blood, By hook or crook, Chicken hearted, Cut a sorry figure ,Hand in glove, In black and white, In the twinkling, In full swing ,Is blind as a bat, No rose without a thorn, Once in a blue moon, Out of the frying pan in to the fire, know no bounds ,To back out, To bell the cat, To blow one's trumpet, To call a spade a spade, To cut one's coat according to one's cloth, To eat humble pie, To give ear to, To have a thing on one's finger tips, To have one's foot in the grave, To hold one's tongue, To kill two birds with one stone, To make an ass of oneself, To put two and two together, To the back bone, Turn coat, ups and downs.
4.5 Pairs of words commonly misused and confused: Accept-except, Access-excess, Affect-effect, Artificial- artful, Aspire-expire, Bail-bale, Bare-bear, Berth-birth, Beside-besides,

Break-brake, Canvas-canvass, Course- coarse, Casual-causal, Council-counsel, Continual-continuous, Coma-comma, Cue- queue, Corpse- corps-core, Dairy-diary, Desert-dessert, Dual-duel, Dew- due, Die-dye, Draft- draught-drought, Device-devise, Doze-dose, Eligible-illegible, Emigrant- immigrant, Envelop-envelope, Farther-further, Gate-gait, Goal-goal, Human-humane, Honorable-honorary, Hail-hale, Hair-heir-hare, Industrial-industrious, Impossible- impassable, Idle-idol-ideal, Lose-loose, Later-latter, Lesson-lessen, Main-Mane, Mental-mantle, Metal-mettle, Meter-metre, Oar-ore, Pray-prey, Plain-plan, Principal - principle, Personal- personnel, Roll- role, Route-rout- roote, Stationary-stationery, Union- unity, Urban- urbane, Vocation- vacation, Vain- vein-vane, Vary- very.

4.6 Translation of Administrative and Technical Terms in Hindi or Mother tongue: Academy, Abandon, Acting in official capacity, Administrator, Admission, Aforesaid, Affidavit, Agenda, Alma Master, Ambiguous, Appointing Authority, Apprentice, Additional, Advertisement, Assistant, Assumption of charge, Assurance, Attested copy, Bonafide, Bond, Cashier, Chief Minister, Chief Justice Clerical error, Commanding ,Officer, Consent, Contractor, corruption, Craftsman, Compensation, Code, Compensatory allowance, Compile, Confidential letter, Daily Wager, Data, Dearness allowance, Death - Cum Retirement, Dispatch, Dispatch Register, Disciplinary, Disciplinary Action, Disparity Department, Dictionary, Director, Director of Technical Education, Earned Leave, Efficiency Bar, Estate, Exemption, Executive Engineer, Extraordinary, Employment Exchange, Flying Squad, General Body, Head Clerk, Head Office, High Commission, Inconvenience, Income Tax, Indian Assembly Service, Justify, Legislative Assembly, Negligence, Officiating ,Office Record, Office Discipline, On Probation, Part Time, Performance, Polytechnic, Proof Reader Precautionary, Provisional, Qualified, Regret, Responsibility, Self-Sufficient, Senior, Simultaneous ,Staff, Stenography ,Superior, Slate, Takeover, Target Data Technical Approval, Tenure, Temporary, Timely Compliance, Under Investigation, Under Consideration, Verification, Viva-voce, Write off, Working Committee, Warning, Yours Faithfully , Zero Hour.

UNIT V

Employability Skills

5.1 Presentation Skills: How to prepare and deliver a good presentation

5.2 Telephone Etiquettes

5.3 Importance of developing employable and soft skills

5.4 Resume Writing: Definition, Kinds of Resume, Difference between Bio-data and Curriculum Vitae and Preparing a Resume for Job/ Internship

5.5 Group discussions: Concept and fundamentals of GD, and learning Group Dynamics.

5.6 Case Studies and Role Plays

PRACTICAL EXERCISES

1. Reading Practice of the above lessons in the Lab Activity classes.
2. Comprehension exercises of unseen passages along with the given lessons.
3. Vocabulary enrichment and grammar exercises based on the above selective readings.
4. Situational Conversation: Requesting and responding to requests; Expressing sympathy and condolence.
5. Warning; Asking and giving information.
6. Getting and giving permission.
7. Asking for and giving opinions.
8. A small formal and informal speech.
9. Seminar.
10. Debate.
11. Interview Skills: Preparing for the Interview and guidelines for success in the Interview and significance of acceptable body-language during the Interview.
12. Written Drills will be undertaken in the class to facilitate a holistic linguistic competency among learners.
13. Participation in a GD, Functional and Non-functional roles in GD, Case Studies and Role Plays
14. Presentations, using audio-visual aids (including power-point).
15. Telephonic interviews, face to face interviews.
16. Presentations as Mode of Communication: Persuasive Presentations using multi-media aids.
17. Practice of idioms and phrases on: Above board , Apple of One's eye , At sea, At random, At large, A burning question, A child's play, A wolf in sheep's clothing, A deal, Breath one's last, Bid fair to, Beat about the bush, Blue Blood, Big Gun, Bring to Book, Cut a sorry figure, Call names, Carry weight, Dark Horse, Eat Humble pie, Feel small, French leave, Grease the palm, Go against the grains, Get One's nerves, Hard and Fast, Hue and Cry, Head and ears, In full swing, Jack of all trades, know no bounds, kiss the dust, Keep an eye on, Lion's share, learn by rote, Null and void, on the cards, Pull a long face, Run amuck, Right and Left, Rain on Shine, Small talk, Take to one's heels, Tooth and nail, to take by storm, , Wet blanket, Yearn for.

RECOMMENDED BOOKS

1. Alvinder Dhillon and Parmod Kumar Singla, "Text Book of English and Communication Skills Vol – 1, 2", M/s Abhishek Publications, Chandigarh.
2. J Sethi, Kamlesh Sadanand & DV Jindal, "Course in English Pronunciation", PHI Learning Pvt. Ltd., New Delhi.
3. Wren and Martin, "High School English Grammar and Composition" .
4. NK Aggarwal and FT Wood, "English Grammar, Composition and Usage", Macmillan Publishers India Ltd., New Delhi.
5. RC Sharma, and Krishna Mohan, "Business Correspondence & Report Writing", (4^{th} Edition), by Tata MC Graw Hills, New Delhi.
6. Varinder Kumar, Bodh Raj & NP Manocha, "Business Communication Skills", Kalyani Publisher, New Delhi.
7. Kavita Tyagi & Padma Misra, "Professional Communication", PHI Learning Pvt. Ltd., New Delhi.
8. Nira Konar, "Communication Skills for Professionals", PHI Learning Pvt. Ltd., New Delhi.
9. Krishna Mohan & Meera Banerji, "Developing Communication Skills", (2^{nd} Edition), Macmillan Publishers India Ltd., New Delhi.
10. M. Ashraf Rizwi, "Effective Technical Communication", Tata MC Graw Hills, New Delhi.
11. Andrea J Rutherford, "Basic Communication Skills for Technology", Pearson Education, New Delhi.

INSTRUCTIONAL STRATEGY

This is practice based subject and topics taught in the class should be practiced in the Lab regularly for development of required communication skills in the students. Emphasis should be given on practicing of communication skills. This subject contains five unit of equal weight age.

4.2 SPINNING TECHNOLOGY - II

L	P
3	4

RATIONALE

Textile technology students should have knowledge basic concepts and purpose of the spinning mill machines used in preparatory process of yarn making. They are expected to know about the settings, quality, production of draw frame, comber and speed frame machine. They should have good exposure about the latest machines and maintenance of these machines.

COURSE OUTCOMES

After undergoing the subject, the students will be able to:
CO 1: Learn about the Draw Frame and its purpose.
CO2: Calculate draft and production of Draw Frame.
CO3: Acquire knowledge about the sliver lap machine.
CO4: Describe the speed frame i.e. passage, gearing, drafting and production.
CO5: Explain autoleveller and latest Draw Frame machines.

DETAILED CONTENTS

UNIT I

Draw Frame

Objective of drawing, passage of material through draw frame and functions of different parts. Different types of drafting systems. Factors affecting the roller settings in draw frame. Weighting systems for top rollers on modern draw frame. Draw Frame Model i.e. RSB-851, RSB- 951, RSB D45. Importance and study of various stop motion on modern draw frame. Objectives, Principle and working of autoleveller at draw frame, type of autoleveller.

UNIT II

Sliver Lap Machine (SLM)

Objectives, nomenclature, functions of various parts. Passage of material through the machine. Drawing, Lap Formation, Omega lap and servo lap and its advantage.

UNIT III

Comber

Principles, objectives, evaluation of combing, degree of combing. Description and working of various parts, passage of material through modern comber. Combing cycle, combing cycle with reference to relative position of various parts and index numbers. Study of comber cylinder, top comb, detaching rollers, nippers. Types of feeding Motions and working mechanisms of feeding. Feed per nip settings and their effects. Comber Noil, method of finding comber noil percentage and factors upon which comber noil depends, how to control noil percentage. Difference between carded and combed yarn. Modern developments in combing E80 and E85 comber.

UNIT IV

Speed Frame

Introduction and object of Speed Frame. Nomenclature of various parts, passage of material through S/F machine. Drafting mechanism, setting and weighting of drafting rollers. Twisting- Twist multiplier, method of twisting, flyer and its function. Winding- Principle of winding, bobbin leading and flyer leading system, coiling of roving. Objective of building motion, construction and working of building motion (lifting of bobbin rail, tapering of material on bobbin, shifting of belt on cone drums). Differential motion- Objectives, principle, study of differential motions used on modern speed frame. Tension control mechanism with sensor. Roving breaks remedies. Modern development in the speed frame.

UNIT V

Calculations

Calculation of production per machine, per shift. Calculation of front roll delivery and spindle speed. Calculation of twist per inch and twist multiplier, Calculation of production constant, draft constant, break draft constant and twist constant. Calculation of total draft, break draft and individual zone draft of the machine.

PRACTICAL EXERCISES

1. Demonstrate the passage of material through draw frame.
2. To study roller setting of drafting rollers on draw frame.
3. To study the various stop motion and auto doffing mechanism of draw frame.

4. Calculations of speeds, drafts and production of draw frame machine from gearing diagram.
5. To draw can and coiler arrangement in draw frame machine.
6. To sketch and describe the working of sliver lap machine with gearing.
7. To study doffing mechanism of sliver lap machine.
8. Demonstration on comber machine, working of various parts and passage through the comber machine.
9. Demonstration and practice of combing cycle with reference to relative position of various parts and index numbers.
10. Calculate draft and draft constant from gearing diagram of comber.
11. Calculate production and production constant from gearing diagram of comber.
12. Demonstration and practice for the passage through the speed frame machine.
13. Practice of setting drafting rollers and calculate draft and draft constant from gearing diagram of modern Speed frames.
14. To study role of sliver condenser, floating condenser, spacer, aprons.
15. Practice of drawing of building motion and its operation of speed frame.
16. Calculate production and production constant from gearing diagram of speed frame.
17. To study auto doffing and bobbin transport system in speed frame through mill visit.
18. To study about calculation of ratchet wheel, lifter change wheel, draft change pinion for various hanks with Calculation of break draft & creel draft with the help of gearing diagram of Speed frame.

RECOMMENDED BOOKS

1. Venkatasubramani, “Spun Yarn Technology” Vol.1. by Butterworths, London, 1988.
2. Gilbert R merril, “Cotton Opening and Picking” by Textile Book Service.
3. “Manual of Cotton Spinning” Vol.-II and part-I, Textile Institute.
4. Zoltan S Szaloki, “Opening, Cleaning and Picking” by Institute of Textile Technology.

5. T.K. Pattabhiram, "Essential Elements of Practical Cotton Spinning" by Somaiya Publication Pvt. Ltd.
6. W Klein, "A practical Guide to Short Staple spinning" by The Textile Institute Publication, 1998.
7. WS Taggart, "Cotton Spinning" by, Bombay, Universal book Corporation (1979).
8. WS Taggart, "Cotton Spinning Calculations by, Published by Macmillan and Co., Limited, London, 1939.
9. Pattabhiram, "Essential Calculations on practical Cotton Spinning" by Samainy Pub, Mumbai, (1997) 5th edition.
10. A.F.W. and Dakin G, "Doubled Yarn" parts I to V by Coulson.
11. Sharma, Aggarwal, "Blowroom, DK740 Card", NITRA

SUGGESTED WEBSITES

1. https://textilelearner.net/what-is-textile-basic-textiles/
2. https://textilestudycenter.com/
3. http://swayam.gov.in

INSTRUCTIONAL STRATEGY

This is hands on practice based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills in the students. This subject contains five units of equal weight age.

4.3 WEAVING TECHNOLOGY - II

L	P
3	4

RATIONALE

Textile technology students are placed in weaving industry, fabric testing and relevant fields. They need to clear various design that can be developed in fabric during weaving process. The subject. This subject will impart awareness about different shedding techniques to produce fabrics for furnishing, bed sheets, sofa covers etc.

COURSE OUTCOMES

After undergoing the subject, the students will be able to:
CO1: Learn different kind of dobby mechanism.
CO2: Identify faults in dobby weaving.
CO3: Classify Jacquards and differentiate Jacquard weaving with dobby and tappet weaving.
CO4: Describe the construction and working of various types of Jacquard.
CO5: Calculate the production and efficiency of dobby and jacquard looms.

DETAILED CONTENTS

UNIT I
Dobby

Introduction to Dobby and its objects. Comparison of Tappet and Dobby Shedding. Introduction to different kind of dobby with respect to lifts, shed formation, working of pattern cylinders. Comparison of single lift and double lift Dobby. Mechanism and working of different parts of Climax dobby. Introduction to paper dobby. Faults in dobby weaving and their rectification. Introduction to Cam dobby.

UNIT II
Jacquard

Introduction to figure weaving and objects of Jacquard shedding. Classification of Jacquards. Comparison of Jacquard weaving with dobby and tappet weaving. Introduction of Single and double lift Principle of Jacquard shedding. Construction and working of various parts of Single

Lift Single Cylinder (SLSC) Jacquard and its limitations. Construction and working of various parts of Double Lift Jacquards (DLSC, DLDC). Comparison of Single Lift Jacquards with double Lift Jacquards. Comparison of Jacquard weaving with dobby and tappet weaving.

UNIT III

Electronic Jacquard and Harness

Study of working of various parts of Electronic Jacquard and advantages of electronics Jacquard over conventional Jacquard. Harness building, Parts of Harness, Straight tie, Pointed tie, Mixed tie, Borders and middle tie.

UNIT IV

Card cutting machine

Its working and process of card lacing (chain maker)

UNIT V

Faults and Calculation

Faults in Jacquard weaving and their Rectification. Calculation of production, efficiency effect on production, calculation relating to set of harness and set of the reed.

PRACTICAL EXERCISES

1. Preparation of lattice for left hand and factors deciding the preparation of lattice.
2. Preparation of lattice for right hand dobby.
3. Mechanism and working of different parts of Keighley dobby.
4. Setting of Cylinder, knives and Feelers of Keighley dobby and sketching of the same.
5. Adjustment / setting of various parts of climax dobby with sketch.
6. Timing of various working parts of dobby
7. Function and sketching of Needles, Spring Box, Needle Board of Jacquard.
8. Function and sketching of Hooks, Griffe, Cylinder and Pattern Cards of Jacquard
9. Function and sketching of Card Cradle, Harness, Comber Board, Coupling and Lingo of Jacquard.
10. Sequence wise preparation of Jacquard Design – Example (from cloth design-graph paper design and Jacquard)
11. Practice of Harness mounting on a loom.
12. Practice of Harness building on a loom.
13. Practice of Card-punching on machine.

14. Practice of the Calculation of production, efficiency of loom.
15. Calculation of set of harness.

RECOMMENDED BOOKS

1. Marinal Kanti Talukdar, P. K. Sriramulu, Dinkar Bapurao Ajgaonkar, "Weaving machines, mechanisms and management" by. Mahajan Publisher Ahamdabad 1998.
2. Weaving Mechanism Vol I and II by N.N. Banerjee. Textile Book House, West Bangal. 1982.
3. Sorabji M. Rutnagur Shutteless Weaving Mechanism-Bombay Textile Research Association, 2007.
4. T.W. Fox, "Weaving Mechanism" by Macmillan and Company, 2005.
5. Abhijit Majumdar , "Principles of Woven Fabric Manufacturing" by CRC Press 2016.
6. Sen Gupta, "Weaving Calculation" by D.B. Taraporevala Sons, 1981.
7. Kishar, "Weaving Technology in India" by
8. S.S Satsangi, "Jacquard Ek Saral Vidya" (in Hindi and English both) by M/s Usha Publishers (SBB/AC-IV Shalimar Building Delhi-88
9. S.S. Satsangi, "Saral Vastra Sangrachna" (Simple Fabric Structure – in Hindi) by M/S Usha Publishers, Shalimar Bagh, Delhi-88
10. K.T. Ashwani, "Plain Weaving Motion" by Abhisek Publication Ltd. Chandigarh.
11. Weaving Calculations by FB&C Limited. Creative Media Partners, LLC, (2016).
12. R Marks and ATC Robbinson, "Principals of Weaving" Textile Institute, (1976).
13. Sabit Adanur, "Handbook of Weaving" CRC Press 2019.

SUGGESTED WEBSITES

1. https://textilelearner.net/what-is-textile-basic-textiles/
2. https://textilestudycenter.com/
3. http://swayam.gov.in

INSTRUCTIONAL STRATEGY

This is hands on practice based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills in the students. This subject contains five units of equal weight age.

4.4 TEXTILE TESTING - I

L	P
3	4

RATIONALE

Textile technology students after completing this level are expected to perform testing at all levels. Students at this stage are expected have required skills related to material testing at various stages of production and finishing. Thus this subject of textile testing has been included in the curriculum.

COURSE OUTCOMES

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

CO1: Learn about various fiber testing requirements.
CO2: Handle various instruments used in fiber testing.
CO3: Describe at various stages of testing in yarn processes.
CO4: Test yarn using various mechanical and electronic instruments.
CO5 Compare the actual and standards of yarn quality parameters.

DETAILED CONTENTS

UNIT I

Importance of Textile Testing and Quality Control

Introduction to textile testing (aim and Scope). Importance and objectives of textile testing. Sampling techniques. Random and biased samples. Zoning techniques for raw cotton. Yarn sampling methods.

UNIT II

Fibre dimension

Mean length, staple length, effective length, Span length, 2.5% span length, 50% span length, short fiber percentage. Analysis of Baer sorter diagram. Definition of fibre fineness. Importance of fibre fineness. Principle of air flow machines for measurement of fineness. Fiber strength**,** fibre maturity, maturity percentage and maturity ratio. Definition of moisture content and moisture regain of textiles. Relative and absolute humidity. Standard Atmospheric conditions. Wet and dry bulb hygrometer. Humidity and its importance to textile material. Estimation of foreign matter. Trash percent in cotton.

UNIT III

Fiber testing instruments

HVI instrument, principle, uses and advantages. AFIS yarn analysis. Bundle Fiber strength tester. Maturity of cotton fibre by Caustic Soda Method, Differential Dyeing Method and Polarised Light Method. Measurement of moisture regain by Oven dry method. Trash analysis in cotton by Shirley trash analyser.

UNIT IV

Yarn Testing-I

Twist and its importance. Its effects on yarn properties. Twist factor, single and ply yarn. Twist Testers. Twist by direct count method, single yarn twist tester, ply yarn twist tester, twist untwist method. Yarn numbering systems. Direct, Indirect and Universal systems of yarn numbering. Conversion factors for various numbering systems in detail. Determination of count of yarn by simple weighing method and from small length by Bessley's yarn balance.

UNIT V

Yarn Testing-II

Yarn strength- Single yarn and lea strength tester. Elongation- Breaking elongation. Elongation at break. Count strength product. CRE, CRL, CRT type. Factor affecting the tensile property of yarn. Principle of tensile testing machine. Tensile strength Testing of Yarn. Single and lea strength tester. Evenness of yarn. Principle, working and advantage and disadvantage of uster eveness tester. Classification of Yarn Faults and Its Removal. Classimate yarn fault analysis.

PRACTICAL EXERCISES

1. To find out Fibre length by Digital Fibrograph.
2. To find out maturity of cotton fibre by Caustic Soda Method.
3. To find out fibre fineness by air flow method using Sheffield Micronaire instrument.
4. To find relative humidity by dry and wet bulb thermometers and Whirling Hygrometer.
5. To find out moisture content of textiles by Oven Drying and Electronic Moisture Meter.
6. To find out trash content of cotton by trash analyser.
7. To find out count of yarn by simple weighing method.
8. Determination of count of yarn with the help of wrap reel.
9. Determination of count of yarn with the help of Beeslay balance.

10. Determination of count of yarn with the help of quadrant balance.

11. Method of determining yarn strength with the help of single yarn strength tester and Lea strength tester.

12. Determination of yarn twist by Single yarn twist tester.

13. Determination of yarn twist by Ply yarns twist tester.

14. To study bear sorter diagramme for fibre length measurement in detail.

15. To study about estimation of blow room and card machines waste percentage and cleaning efficiency.

16. Learn and use statistics in testing like average, mean, median, mode, coefficient of variation, standard deviation with one example.

17. To study about reporting systems like ERP and SAP.

RECOMMENDED BOOKS

1. Elliot B. Grover and D.S. Hamby "Handbook of textile Testing and Quality Control" by Wiley India Pvt Ltd, (2011).
2. JE Booth, "Principles of Textile Testing" by CBS Publisher Dehli.
3. J.W.S Hearle and W E Morton "Physical Properties of Textile Fibres" by Woodhead Publishing Limited.
4. S.S.Satsangi, "Fabric defects causes and remedies", by M/s Usha Publishers 53B/AC-IV Shalimar Bagh, Delhi-88.
5. Arindam Basu, "Textile Testing: Fibre, Yarn & Fabric ", by South India Textile Research Association, 2006.
6. B P Saville, "Physical Testing of Textiles" by Woodhead Publishing Limited (1999).

SUGGESTED WEBSITES

1. https://textilelearner.net/what-is-textile-basic-textiles/
2. https://textilestudycenter.com/
3. https://nptel.ac.in/courses/116/102/116102052/
4. http://swayam.gov.in

INSTRUCTIONAL STRATEGY

This is hands on practice based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills in the students. This subject contains five units of equal weightage.

4.5 MINOR PROJECT

L	P
-	8

RATIONALE

Minor project work will help in developing the relevant skills among the students as per National Skill Qualification Framework. It aims at exposing the students to the present and future needs of various relevant industries. It is expected from the students to get acquainted with desired attributes for industrial environment. For this purpose, students are required to be involved in Minor Project Work in different establishments.

COURSE OUTCOMES

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

CO1: Define the problem statement of the minor project according to the need of industry.
CO2: Work as a team member for successful completion of minor project.
CO3: Write the minor project report effectively.
CO4: Present the minor project report using PPT.

GUIDELINES

Depending upon the interest of the students, they can develop minor projects as per present and future demand of the industry. The supervisors may guide the students to identify their minor project work and chalk out their plan of action well in advance. As a minor project activity each student is supposed to study the operations at site and prepare a detailed project report of the observations/processes/activities. The supervisor may create a group of 4-5 students as per their interest to work as a team for successful completion of the minor project.

The supervisor shall evaluate the students along with one external expert by considering the following parameters:

	Parameter	**Weightage**
I	Defining problem statement, focus and approach	20%
ii	Innovation / creativity	20%
iii	Report Writing	20%
iv	Power Point Presentation	20%
v	Viva - voce	20%

THIRD YEAR

NSQF LEVEL - 5

18. STUDY AND EVALUATION SCHEME

FIFTH SEMESTER

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week		Credits L+P= C	MARKS IN EVALUATION SCHEME						Total Marks of Internal & External
					INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	P		Th	Pr	Total	Th	Pr	Total	
5.1	Industrial Training - II	-	2	0+1+1	-	40	40	-	60	60	100
5.2	Spinning Technology - III	3	6	3+3=6	40	40	80	60	60	120	200
5.3	Advanced Fabric Manufacturing	3	6	3+3=6	40	40	80	60	60	120	200
5.4	Garment Manufacturing Technology	3	6	3+3=6	40	40	80	60	60	120	200
5.5	Programme Elective - I	3	-	3+0=3	40	-	40	60	-	60	100
5.6	Open Elective (MOOCs^{+}/Offline)	2	-	2+0=2	40	-	40	60	-	60	100
# Student Centered Activities (SCA)		-	1	-	-	-	-	-	-	-	-
Total		**14**	**21**	**24**	**200**	**160**	**360**	**300**	**240**	**540**	**900**

Programme Elective I: **5.5.1. Technical Textiles** **5.5.2. Advanced Fabric Structure**

\+ Assessment of Multidisciplinary Elective through MOOCs shall be based on assignments out of 100 marks.

\# Student Centred Activities will comprise of co-curricular activities like extension lectures on Constitution of India etc, games, hobby clubs e.g. photography etc., seminars, declamation contests, educational field visits, N.C.C., NSS, Cultural Activities and self study etc.

SIXTH SEMESTER

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week		Credits L+P= C	MARKS IN EVALUATION SCHEME						Total Marks of Internal & External
					INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	P		Th	Pr	Total	Th	Pr	Total	
6.1	Textile Testing - II	3	4	3+2=5	40	40	80	60	60	120	200
6.2	*Entrepreneurship Development & Management	3	-	3+0=3	40	-	40	60	-	60	100
6.3	Programme Elective - II	3	-	3+0=3	40	-	40	60	-	60	100
6.4	Computer Applications in Textile Technology	-	4	0+2=2	-	40	40	-	60	60	100
6.5	Major Project/ Industrial Training	-	18	0+9=9	-	40	40	-	60	60	100
Total		**9**	**26**	**22**	**120**	**120**	**240**	**180**	**180**	**360**	**600**

*Common with other Diploma Courses.

Program Electives -II: **6.3.1.** Advance Yarn Manufacturing **6.3.2.** Advanced Knitting Technology

19. HORIZONTAL AND VERTICAL SUBJECTS ORGANISATION

Sr. No.	Subjects/Areas	Hours Per Week	
		Fifth Semester	Sixth Semester
1.	Industrial Training - II	2	-
2.	Spinning Technology - III	9	-
3.	Advanced Fabric Manufacturing	9	-
4.	Garment Manufacturing Technology	9	-
5.	Programme Elective - I	3	-
6.	Open Elective (MOOCs/Offline)	2	-
7.	Textile Testing - II	-	7
8.	Entrepreneurship Development & Management	-	3
9.	Programme Elective - II	-	3
10.	Computer Applications in Textile Technology	-	4
11.	Major Project/Industrial Training	-	18
12.	Student Centered Activities	1	-
	Total	**35**	**35**

20. COMPETENCY PROFILE & EMPLOYMENT OPPORTUNITIES

Government and private sectors related to **Textile Technology** require **supervisors** having well developed skills with clear choice of procedures. They are expected to have complete knowledge and practical skills related to textile technology field. They shall be able to communicate clearly with others. Diploma holders after passing level 5 shall have understanding of desired mathematical skills and understanding of social and natural environment. They are expected to collect, organize and communicate information effectively.

Work requiring knowledge, skills and aptitudes at level 5 will also be carried out in familiar situations, but also ones where problems may arise. Job holders will be able to make choices about the best procedures to adopt to address problems where the choices are clear. Individuals in jobs which require level 5 qualifications will normally be responsible for the completion of their own work and expected to learn and improve their performance on the job. They will require well developed practical and cognitive skills to complete their work. They may also have some responsibility for others' work and learning.

Textile Technology diploma pass out students will be expected to understand what constitutes quality in the occupation and will distinguish between good and bad quality in the context of their work. They will be expected to operate hygienically and in ways which show an understanding of environmental issues. They will take account of health and safety issues as they affect the work they carry out or supervise. They are expected have the good theoretical and practical knowledge of spinning technology, advanced fabric manufacturing garment manufacturing technology along with textile testing for working efficiently in industries related to textile technology. They are also expected to have good practical knowledge and exposure of computer applications in textile technology.

Textile technology diploma students are expected to have wide scope to work in textile mills, processing houses, garment export houses, weaving mills, textile testing houses, fabric quality control centers and production units in garment manufacturing industries. They can start their own small start-ups in the area of marketing, sales, manufacturing and production etc.

21. PROGRAMME OUTCOMES

The programme outcomes are derived from five domains of NSQF Level – 5 namely Process, Professional Knowledge, Professional Skill, Core Skill, Responsibility. After completing this level, the student will be able to:

PO1: Perform task that require well developed skills with clear choice of procedures.

PO2: Acquire knowledge of facts, principles and processes related to textile technology.

PO3: Demonstrate cognitive and practical skills to complete tasks and solve problems.

PO4: Develop skills to collect, organize and communicate information.

PO5: Accomplish own work and supervise others work.

PO6: Select online open elective of own interest to promote self-learning.

22. ASSESSMENT OF PROGRAMME AND COURSE OUTCOMES

Programme Outcomes to be assessed	Assessment criteria for the Course Outcomes
PO1: Perform task that require well developed skills with clear choice of procedures.	• Perform calculation of Ring Frame machine • Handle calculation of Ring Doubling machine • Differentiate between Woolen &Worsted yarn • Describe compact and normal yarn • Perform classification of rapiers • Handle fabric defects their causes and remedies • Perform the cutting of the fabric • Use various components and trimmings • Handle the inspection and total quality control • Test Fabric strength using tensile strength tester • Perform fabric thickness testing using thickness tester • Measure serviceability by Abrasion, Stiffness, Handle & drape of fabric • Learn and measure of fabric shrinkage. • Describe and handle fastness testing • Practice software related to textile technology • Sight demonstration of CAD for textile technology • Handle textile technology related computer networking • View demonstration of CAM processes
PO2: Acquire knowledge of facts, principles and processes related to textile technology.	• Acquire knowledge about ring frame and drafting system • Differentiate between Woolen &Worsted yarn • Describe compact and normal yarn • Acquire knowledge about warp stop motion and weft feelers • Study different types of looms • Explain in detail various types of selvedges • Study properties and types of seams • Explain principles and methods of pressing • Acquire knowledge about the classification of

	technical textiles along with characteristics • Study different types of medical and automotive textiles • Define protective, industrial and sports textiles • Explain packaging, coating and laminating textiles • Explore smart textiles along with classification and challenges • Acquire knowledge about the classification of backed cloth • Study different types of double cloth • Learn about pile fabrics and their characteristics • Explain about weft pile structure in detail • Explore Damasks and Figured warp rib brocades • Learn and measure of fabric shrinkage. • Describe and handle fastness testing • Learn about the need of new spinning systems • Study important parts of Rotor Spinning Machine • Understand principles and properties of air-jet spinning. • Explain advantages and disadvantages of friction spinning • Acquire knowledge about man-made fiber / filament production • Learn about advancement in knitting technology • Study warp knitting and its applications • Explain warp knitting structure in detail • Understand the concept of advanced knit structure • Explore various applications of advanced knitting
PO3: Demonstrate cognitive and practical skills to complete tasks and solve problems.	• Perform calculation of Ring Frame machine • Handle calculation of Ring Doubling machine • Differentiate between Woolen &Worsted yarn • Describe compact and normal yarn • Perform classification of rapiers • Handle fabric defects their causes and remedies

	• Perform the cutting of the fabric • Use various components and trimmings • Handle the inspection and total quality control • Test Fabric strength using tensile strength tester • Perform fabric thickness testing using thickness tester • Measure serviceability by Abrasion, Stiffness, Handle & drape of fabric • Learn and measure of fabric shrinkage. • Describe and handle fastness testing • Practice software related to textile technology • Sight demonstration of CAD for textile technology • Handle textile technology related computer networking • View demonstration of CAM processes
PO4: Develop skills to collect, organize and communicate information.	• Understand the working environment of industries • Learn about present and future requirement of industries. • Develop writing, speaking and presentations skills. • Observe technological developments as per present and future needs of industries. • Collect, communicate and manage the data from connected devices. • Comprehend the importance of entrepreneurship and its role in nation's development. • Classify the various types of business and business organizations. • Identify the various resources / sources and / or schemes for starting a new venture. • Explain the principles of management including its functions in an organisation. • Conduct market survey and prepare project report. • Define the problem statement of the Industrial

	training / Major project according to the need of industry. • Write the Internship / Major project report effectively. • Present the Internship / Major project report using PPT.
PO5: Accomplish own work and supervise others work.	• Take necessary safety precautions and measures. • Work in team for solving industrial problems • Develop competencies and skills required by relevant industries. • Define the problem statement of the Industrial training / Major project according to the need of industry. • Work as a team member for successful completion of Industrial training / Major project. • Write the Internship / Major project report effectively. • Present the Internship / Major project report using PPT.
PO6: Select open elective of own interest to develop self-learning habit through online courses.	• State the basic concepts and principles about the subject of interest. • Perform in a better way in the professional world. • Select and learn the subject related to own interest. • Explore latest developments in the field of interest. • Develop the habit of self-learning through online courses.

23. SUBJECTS & CONTENTS

(THIRD YEAR)

FIFTH SEMESTER

5.1 INDUSTRIAL TRAINING-II

L	P
-	2

RATIONALE

Industrial training will help the students to understand the working environment of relevant industries. The student will learn to work in team to solve the industrial problems. It will also give exposure about the present and future requirements of the relevant industries. This trainingis very important for development of required competencies and skills for employment and start– ups.

COURSE OUTCOMES

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

CO1: Understand the working environment of industries
CO2: Take necessary safety precautions and measures.
CO3: Learn about present and future requirement of industries.
CO4: Work in team for solving industrial problems
CO5: Develop competencies and skills required by relevant industries.
CO6: Develop writing, speaking and presentations skills.

PRACTICAL EXERCISES

1. Report writing based on industrial training.
2. Preparation of Power Point Slides based on industrial training and presentation by the candidate.
3. Internal Evaluation based on quality of Report, PPT preparation, PPT presentation and answer to queries.
4. External Evaluation based on quality of Report, PPT preparation, PPT presentation and answer to queries.

GUIDELINES

Students will be evaluated based on Industrial training report and their presentation using Power Point about the knowledge and skills gained during the training. The Headof the Department will depute faculty coordinators by assigning a group of students to each. The coordinators will mentor and guide the students in preparing the PPTs for final presentation. The following performance parameters are to be considered for assessment of the students out of 100 marks:

	Parameter	**Weightage**
i	Industrial assessment of the candidate by the trainer	40%
ii	Report Writing	20%
iii	Power Point Presentation	20%
iv	Viva-voce	20%

5.2 SPINNING TECHNOLOGY - III

L	P
3	6

RATIONALE

Textile technology students should have knowledge of basic concepts, objectives, working performance, quality, production of Ring frame and Doubling Machine. They should also have the knowledge of basic concepts and objectives of machinery used in the woolen and worsted mills along with maintenance skills.

COURSE OUTCOMES

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

CO1: Acquire knowledge about ring frame and drafting system

CO2: Perform calculation of Ring Frame machine

CO3: Handle calculation of Ring Doubling machine

CO4: Differentiate between Woolen &Worsted yarn

CO5: Describe compact and normal yarn

DETAILED CONTENTS

UNIT-I

Introduction and objectives of a Ring Frame, nomenclature of various parts of a Ring Frame, passage of material through it. Drafting, function of the drafting system, study of top arm drafting system, apron drafting, advantages of apron rafting. Introduction to rings, ring running-in process, ring sizes and different types of rings, ring travelers, its functions, types of travelers, their sizes. Numbering, profiles and finish of travelers. Changing schedules of travelers. Selection of ring, travelers for different count. Insertion of twist into the yarn, S and Z twists, effect of twist on yarn, selection of TM for various count.

UNIT-II

Building motion mechanism, insertion of coil on bobbin. Yarn ballooning, yarn ballooning control rings separators, lappets. Reasons for end breaks and their remedies on Ring Frame. Principle of Auto doffing at Ring Frame. Principle of variable pulley speed at Ring Frame. Workload distribution at Ring Frame. Calculation of Ring Frame machine. Calculation of spindle speed, front roll speed, production per shift per machine, production constant, Average Count. Calculation of total draft, break draft an individual zone draft, draft constant, break draft constant. Calculation of twist per inch and twist multiplier, Calculation of traveler speed.

UNIT-III

Objects of Ring Doubling. Doubling and its effects, dry and wet systems of doubling. Twist insertion in ply yarn. Types and amount of twist. Factors effecting the Twist multiplier for double yarn. Yarn defects and their causes and remedial measures in doubling machine. Improvement in quality and productivity performance of a Doubling machine. Working principle of TFO.

Calculation of Ring Doubling machine Calculation of spindle speed, delivery roll speed production per machine, production constant, twist per inch/ twist multiplier and twist constant, Resultant Count.

UNIT-IV

Difference between Woolen &Worsted yarn. Brief description of Sequence of machinery used in the production of woolen yarn and worsted yarn

Various maintenance schedules adopted in a ring frame and doubling machine.

UNIT-V

Compact yarn, Difference between compact and normal yarn. Introduction of Compact systems like Elite.

Brief exposure of Value added and mélange yarns: Core spun yarn, Lycra yarn, Jaspe (Double roving) yarn, Roving grindle, Neppy Yarn, Slub yarn, Melange Yarn, Snow heather yarns

PRACTICAL EXERCISES

1. Practice of passage of material through Ring Frame.
2. Practice of drafting roller settings. Mill visit be arranged to see top arm weighing system.
3. Practice on ring and traveler, spindle gauge/ setting.
4. Practice of inserting S and Z twist in the yarn and draw sketches.
5. Practice of drawing and setting of building Motion of ring frame.
6. Different auto doffing systems or their videos.

7. Gearing diagram of Ring Frame. Calculation of spindle speed, front roll speed, production per shift per machine, production constant. Calculation of total draft, break draft and individual zone draft, draft constant, break draft constant. Calculation of TPI and Twist Multiplier ™, twist constant, calculation of traveler speed. Calculation of yarn content on bobbin.
8. Practice of passage of yarn through Ring Doubling Machine. Different parts and their working.
9. Practice to find the direction of twist in ply yarn.
10. Practice of drawing gearing diagram on Ring Doubling Machine. Calculation of production per machine and production constant. Calculation, of spindle speed, delivery roll speed, twist per inch/twist Multiplier and twist constant.
11. Demonstration of working of TFO during mill visit / training
12. Calculation of balancing of machines in different sections for a particular spin plan requirement.

RECOMMENDED BOOKS

1. SpunYarnTechnology,Vol.3 and 4 by Venkat Subramani
2. Cotton Ring Spinning by GR Merril
3. Manual of Cotton Spinning by Textile Institute
4. Cotton Spinning by WS Taggart
5. Cotton Spinning calculations by WS Taggart
6. Essential Calculations of Cotton Spinning by Pattabhiram
7. Textile Mathematics Vol.-I, II and III by JE Booth

RECOMMENDED WEBSITES

1. https://textilelearner.net
2. https://archive.nptel.ac.in/noc/courses/116/
3. https://textilestudycenter.com

INSTRUCTIONAL STRATEGY

This is a skill based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills in students. This subject contains five units of equal weight age with hands on practice for skill development.

5.3 ADVANCED FABRIC MANUFACTURING

L	P
3	6

RATIONALE

The student of diploma in textile technology must be familiar with the latest machines of fabric manufacturing used in modern industry. This subject will help the students to acquire knowledge about warp stop motion and types of looms. This subject will further give exposure of rapier loom and students will learn about the need and types of Selvedges.

COURSE OUTCOMES

After undergoing the subject, the students will be able to:
CO1: Acquire knowledge about warp stop motion and weft feelers
CO2: Study different types of looms
CO3: Perform classification of rapiers
CO4: Explain in detail various types of selvedges
CO5: Handle fabric defects their causes and remedies

DETAILED CONTENTS

UNIT-I

Warp Stop Motion: Objectives, types and principle of working of warp stop motion.
Temples: Purpose and different types of temples in relation to different fabrics.
Weft Feelers: Purpose and different types (Mechanical, Electrical, Photo electric) with their advantages & disadvantages.

UNIT II

Introduction to automatic loom, working of automatic pirn change mechanism, types of shuttle less looms, Rate of weft insertion in different types of looms, weft accumulator or weft measuring motion.
Introduction to Projectile or Gripper Loom, dimensions of gripper, Main Features/ specifications of Gripper Loom.

UNIT III

Introduction to Rapier Loom, Rapier weft insertion method, Classification of rapiers, Concept of Dewas and Gabler Rapiers, Main Features/ specifications of rapier loom.

Introduction to Air Jet Loom, passage of material and working of air jet loom, main features of Air-Jet Loom.

UNIT IV

Purpose of Selvedges, Different types of selvedges formed in shuttle less looms.

Introduction to Terry Pile Weaving, Features of a Terry Loom.

UNIT V

Fabric defects their causes and remedies.

Factors effecting the production and efficiency in weaving department.

Calculations relating to production and efficiency of loom.

PRACTICAL EXERCISES

1. To study the construction details and working of electrical warp stop motions.
2. Study of different types of temples with diagram.
3. Study of different types of weft feeler with their advantages & disadvantages.
4. Make a neat and clean diagram of automatic pirn change mechanism and describe its working.
5. To study the weft insertion method in gripper loom with diagram.
6. To study rapier weft insertion method in rapier weaving and classification of rapiers with diagram.
7. To study the passage of material and working of air jet loom.
8. Study of comparison of weft insertion rate in different shuttle less looms with their applications.
9. Study of leno and tuck-in selvedge formation.
10. Study of mechanism of pile formation in terry weaving.
11. Enlist the various fabric defects along with their causes and remedies.
12. To calculate the actual production of a loom by assuming suitable data.

RECOMMENDED BOOKS

1. Weaving Mechanism by T.W. Fox.
2. Rapier Loom - WIRA
3. Weaving Mechanism by N.N. Banerjee

4. Weaving Mechanism by DS Verma
5. Weaving Calculation by Sen Gupta
6. Weaving Technology in India by Kishar
7. Shuttle-less Weaving Mechanism - BTRA

RECOMMENDED WEBSITES

1. https://textilelearner.net/warp-protector-motion-types-working-principle/
2. http://mytextilenotes.blogspot.com/2009/07/loom-temples.html#google_vignette
3. https://textilelearner.net/types-of-weft-stop-motion-in-weaving/
4. https://textilelearner.net/projectile-weaving-machine/
5. https://textilelearner.net/rapier-loom-types-weft-insertion/
6. https://textilelearner.net/air-jet-loom-working-principle-data-processing-advantages/
7. https://textilelearner.net/selvedge-formation-techniques-in-woven-fabrics/
8. https://www.textileadvisor.com/2021/02/terry-weave-l-types-of-terry-fabricl.html#google_vignette
9. https://textilelearner.net/different-types-of-fabric-faults-causes/
10. https://www.textilecalculations.com/calculation-of-weaving-loom-efficiency/
11. https://archive.nptel.ac.in/courses/116/102/116102017/

INSTRUCTIONAL STRATEGY

This is a skill based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills in students. This subject contains five units of equal weight age with hands on practice for skill development.

5.4 GARMENT MANUFACTURING TECHNOLOGY

L	P
3	6

RATIONALE

Some of the diploma holders in Textile Technology may also find placement in the Garment House. They are expected to have basic knowledge related to garment manufacturing. This subject will give exposure to the students about cutting and sewing properties. It will further help the students to use components and trimmings along with pressing. This subject will also help in quality control.

COURSE OUTCOMES

After undergoing the subject, the students will be able to:
CO1: Perform the cutting of the fabric
CO2: Study properties and types of seams
CO3: Use various components and trimmings
CO4: Explain principles and methods of pressing
CO5: Handle the inspection and total quality control

DETAILED CONTENTS

UNIT I

Cutting: Cutting tools and equipment, Planning, Drawing, Drafting and Pattern Making and reproduction of the marker, Various ways of spreading of the fabric to form a lay, cutting of the fabric.

UNIT II

Basic sewing machine: Parts and working, Types of seams and stitches, Properties of Seams, Darts, sewing needles and sizes, common sewing defects and their remedies.

UNIT III

Use of components and trimmings: Labels and motifs, linings, interlining, facing and interfacing waddings

UNIT IV

Pressing: The principle of pressing, pressing equipment and methods

UNIT V

Quality control: Principles of quality control, Total Quality control, just in time. Inspection systems and care labeling of apparel and textiles. Eco labels, American Care Labeling (CLS), International care labeling system, British care labeling systems, Japanese care labeling system.

PRACTICAL EXERCISES

1. To prepare Flow chart of garment manufacturing unit.
2. To use tools and equipment used in clothing/ garment constructions.
3. Preparation of fabric for cutting like Straightening, Shrinking, Ironing the fabric.
4. To develop the paper pattern with pattern marking of any garment and exposure to grading.
3. Sequence of cutting: Laying out of pattern pieces, marking, transferring the pattern and cutting
4. Selection and handling of special fabrics while cutting and stitching
5. To study machines parts of sewing machine, threading & working defects remedies and oiling.
6. To study various types of stitches/seams used in sewing process
7. Practice of making of different types of openings, button holes fasteners, tacking & hemming.
8. Practice of making of different types of pleating, Types of Collars, neck-lines, stitching of different cloths
9. Study about Decorative Details in Garment-Frills, flounces, peplums, Trimmings, Belts and bows
10. Demonstration of Appliances required for pressing, finishing and pressing of textiles and finishes (through mill visits only).

RECOMMENDED BOOKS

1. Garment Finishing and Care Labeling by S. S. Satsangi M/s Usha Publishers Delhi
2. Textile Fibres and Fabrics by Bernard P Corbman- M/s McGraw-Hill, International Edition
3. Garment Designs-by Amstrong
4. Pattern Making for Fashion design by Amstrong, Vikas Publishing House Pvt. Ltd. Delhi
5. Clothing Construction by Doongaji, Raj Parkashan, New Delhi

RECOMMENDED WEBSITES

1 https://textilelearner.net
2. https://archive.nptel.ac.in/noc/courses/116/
3. https://textilestudycenter.com

INSTRUCTIONAL STRATEGY

This is a skill based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills in students. This subject contains five units of equal weight age with hands on practice for skill development

5.5 PROGRAMME ELECTIVE-I
5.5.1. TECHNICAL TEXTILES

L	P
3	-

RATIONALE

This subject plays very important role at this level for textile technology diploma students. This subject will help the students to acquire basic knowledge about the outlook of textiles being used in sports, medical, defense, industrial fields, their properties and applications. Hence this subject is included to develop the required relevant competencies.

COURSE OUTCOMES

After undergoing the subject, the students will be able to:
CO1: Acquire knowledge about the classification of technical textiles along with characteristics
CO2: Study different types of medical and automotive textiles
CO3: Define protective, industrial and sports textiles
CO4: Explain packaging, coating and laminating textiles
CO5: Explore smart textiles along with classification and challenges

DETAILED CONTENTS

UNIT-I

Technical Textiles, Introduction: Definition, classification of technical textiles.
Geo-Textiles: Introduction, definition, fibers used for Geo-textiles and their properties.
Characteristics of Geo-Textiles: Woven and non-Woven.
Application of Geo-Textiles: Geo-grids, Geo-nets, Geo-composite, Geo- membranes, Geo-Cell, Geo-mattress.

UNIT-II

Medical Textiles: Introduction, definition and Characteristics of fibers used for medical textiles. Application of Medical Textiles: PPE kit, sutures, Pressure garments, bandages, dressings, gowns,

masks, caps, shoe covers and internal body parts.

UNIT-III

Protective Textiles: Introduction, Definition, Application of Protective Textiles: Bullet Proof fabric, fire proof fabric, high visibility fabric, protection from electromagnetic radiation

Industrial Textiles: Introduction, Definition,. Application of Industrial Textiles: Cord sand ropes, belts and filter fabrics.

Sports Textiles: Introduction, Definition, Application of Sports Textiles: Sports clothing, waterproof breathable materials.

UNIT-IV

Textiles for Packaging: Introduction, Definition, Application of Packaging Textiles: Fabrics for bags and luggage, food packaging.

Coating and Laminating Textiles: Overview and applications of coating and laminating textiles.

UNIT-V

Filtration Textiles: Introduction and its applications

Smart Textiles: Introduction. classification, function, challenges and opportunities.

RECOMMENDED BOOKS

1. V.K.Kothari (Ed), Technical Textiles, IAFL Publications, New Delhi, 2008.
2. R. Horrocksand S. C. Anand, Handbook of Technical Textiles, Woodhead Publishing Limited, Cambridge, 2000.
3. Khatwani,P.A.,Yardi,S.SNCUTE-Programme on Technical textiles Noda lCentre.

RECOMMENDED WEBSITES

1. https://textilelearner.net
2. https://archive.nptel.ac.in/noc/courses/116/
3. https://textilestudycenter.com

INSTRUCTIONAL STRATEGY

This is a theory based subject and contains five units of equal weight age each.

5.5.2 ADVANCE FABRIC STRUCTURE

L	P
3	-

RATIONALE

Textile technology diploma students at this level are expected to have advanced knowledge of fabric structure. This subject deals with more complicated structures of woven fabrics to sustain in the competition of recent market trends. This subject will help in developing required competencies related to advanced fabric structure.

COURSE OUTCOMES

After undergoing this subject, the students will be able to:
CO1: Acquire knowledge about the classification of backed cloth
CO2: Study different types of double cloth
CO3: Learn about pile fabrics and their characteristics
CO4: Explain about weft pile structure in detail
CO5: Explore Damasks and Figured warp rib brocades

DETAILED CONTENTS

UNIT I

Principle of figuring with extra material, extra warp figuring, extra weft figuring.
Comparison of Figuring with extra threads, and Backed cloth, Classification of backed cloth.
Features and example of weft backed clothes and warp backed clothes. Interchanging figured backed clothes, and Features and example of backed cloth with wadded threads.

UNIT II

Features and classification of Double Cloth, Features and example of Self-stitched double clothes, centre stitched double cloth, wadded double clothes (Definition and design only).

UNIT III

Pile Fabrics. Classification of pile fabrics and their characteristics

Terry pile fabrics. Features, requirement and mechanism of formation of terry pile, fabrics. 3 picks, 7 pick, 5 pick and 6 pick face and back terry pile fabric. Ornamentation of terry Pile Structures -design of stripe and check effect.

UNIT IV

Weft pile fabrics, Features, classification and mechanism of Weft Pile Structure, velveteen - All over velveteen, Twill back velveteen. Corduroy, Weft Plush

UNIT V

Damasks (Definition and design only)

Figured warp rib brocades (Definition and design only)

RECOMMENDED BOOKS

1. Grammer of Textile Design: Nisbet
2. Fabric Design: Blinov
3. Advanced Textile design & colour: Watson
4. Fabric Structure and Design by N.Gokarveshan
5. Watson's textile design &colour by Z.J.Grosicki
6. Jacquard – Ek Saral Vidya by S.S. Satsangi , M/S Usha Publishers, 53B/AC IV, Shalimar Bagh, Delhi 88.

RECOMMENDED WEBSITES

1. https://textilelearner.net
2. https://archive.nptel.ac.in/noc/courses/116/
3. https://textilestudycenter.com

INSTRUCTIONAL STRATEGY

This is a theory based subject and contains five units of equal weight age each.

5.6 OPEN ELECTIVE

L	P
2	-

RATIONALE

Open electives are very important and play major role in implementation of National Education Policy. These subjects provide greater autonomy to the students in the curriculum, giving them the opportunity to customize it to reflect their passions and interests. The system of open electives also encourages cross learning, as students pick and choose subjects from the different streams.

COURSE OUTCOMES

At the end of the open elective, the students will be able to:

CO1: State the basic concepts and principles about the subject of interest.
CO2: Perform in a better way in the professional world.
CO3: Select and learn the subject related to own interest.
CO4: Explore latest developments in the field of interest.
CO5: Develop the habit of self-learning through online courses.

LIST OF OPEN ELECTIVES

(The list is indicative and not exhaustive)

1. Computer Application in Business
2. Introduction to NGO Management
3. Basics of Event Management
4. Event Planning
5. Administrative Law
6. Introduction to Advertising
7. Moodle Learning Management System
8. Linux Operating System
9. E-Commerce Technologies
10. NCC
11. Marketing and Sales
12. Graphics and Animations

13. Digital Marketing
14. Human Resource Management
15. Supply Chain Management
16. TQM

GUIDELINES

Open Elective shall be offered preferably in online mode. Online mode open elective shall preferably be through Massive Open Online Courses (MOOCs) from Swayam, NPTEL, Upgrad, Udemy, Khan Academy or any other online portal to promote self-learning. A flexible basket of large number of open electives is suggested which can be modified depending upon the availability of courses at suggested portals and requirements. For online open electives, department coordinators shall be assigned to monitor and guide the group of students for selection of minimum 20 hours duration online course of their choice. For offline open electives, a suitable relevant subject shall be offered by the respective department to the students with minimum 40% of the total class strength as per present and future requirements.

Assessment of MOOCs open elective shall be based on continuous evaluation by the respective coordinator. The coordinator shall consider the submitted assignments by the students from time to time during the conduct of MOOCs. The MOOCs assessment shall be conducted by the coordinator along with one external expert by considering submitted assignments out of 100 marks.

In case, no suitable open elective is available online, only then the course may be conducted in offline mode. The assessment of offline open elective shall be internal and external. The offline open elective internal assessment of 40 marks shall be based on internal sessional tests; assignments etc. and external assessment of 60 marks shall be based on external examination at institute level.

NOTE

The students enrolled under NCC will compulsorily undertake NCC as an open elective subject.

SUGGESTED WEBSITES

1. https://swayam.gov.in/
2. https://www.udemy.com/
3. https://www.upgrad.com/
4. https://www.khanacademy.org/

SIXTH SEMESTER

6.1 TEXTILE TESTING- II

L	P
3	4

RATIONALE

Textile technology diploma students are expected to ensure quality at all levels. The skills in testing of textiles at various stages of production and finishing are essential to be developed in the students. This subject will help in developing required competencies and skills of textile testing for working in relevant industries.

COURSE OUTCOMES

After undergoing the subject, the students will be able to:
CO1: Test Fabric strength using tensile strength tester
CO2: Perform fabric thickness testing using thickness tester
CO3: Measure serviceability by Abrasion, Stiffness, Handle & drape of fabric
CO4: Learn and measure of fabric shrinkage.
CO5: Describe and handle fastness testing

DETAILED CONTENTS

UNIT I

Strength Testing of Textiles
Fabric strength testing by Tensile Strength Tester. Tearing Strength Tester for fabric. Bursting strength testing of fabric by Hydraulic Bursting Strength Tester. Seam Slippage Test.

UNIT II

Fabric thickness testing
Definition of air permeability, air resistance. Porosity Measurement of fabric by Shirley Air Permeability Tester. Fabric GSM measurement and its importance.

UNIT III

Serviceability

Abrasion resistance and serviceability. Wear and abrasion test on fabrics. Definition of Abrasion, Stiffness, Handle & drape. Test of Pilling of Fabric by using ICI Pilling Tester. Definition of Crease recovery and crease resistance. Measurement of crease recovery by Shirley Crease Recovery Tester.

UNIT IV

Dimensional Stability

Fabric shrinkage, relaxation and felting. Measurement of fabric shrinkage. Fabric cover, and its relation with fabric properties.

UNIT V

Fastness Testing and Comfort

Methods of determination of colour fastness to washing, perspiration (acidic and alkaline), rubbing (dry and wet), light and sublimation. Wettability test for fabric water proofing and shower proofing. Drop penetration test.

PRACTICAL EXERCISES

1. Find Out Tensile Strength of Fabrics by Tensile Strength Tester.
2. Find out Tearing strength of fabric by Tearing Strength Tester.
3. Find out bursting strength of fabric by Hydraulic Strength Tester
4. Find out fabric thickness by thickness tester.
5. Find out air permeability of fabric by Air Permeability Tester
6. Find out Crease Recovery of fabric by Crease Recovery Tester.
7. Find out serviceability of fabric by abrasion tester, Use of Drape meter, Stiffness Tester, Abrasion tester
8. Find out crimp in warp and weft of fabric.
9. Shrinkage test by Laundero meter and Template.
10. Flammability test by Flammability Testers.
11. Solubility test of Fabric
12. Colour fastness of fabric: Washing- Laundero meter Perspiration–by Persperometer
13. Rubbing (dry & wet)–Crockmete, Light fastness tester, Sublimation Tester
14. Find out pilling by ICI pillbox (PillingTester).

RECOMMENDED BOOKS

1. Principles of Textile Testing by JE Booth
2. Textile Testing by P Angappan, R Gopalakrishnan
3. Handbook of Textile Testing and Quality Control by Grover and Hamby
4. StainsRemoverfromTextilesandGarmentsbyS.S.Satsangi,UshaPublications, Delhi

RECOMMENDED WEBSITES

1. https://textilelearner.net/what-is-textile-basic-textiles/
2. https://textilestudycenter.com/
3. http://swayam.gov.in
4. https://archive.nptel.ac.in/courses/116/102/116102049/

INSTRUCTIONAL STRATEGY

This is a skill based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills in students. This subject contains five units of equal weight age with hands on practice for skill development.

6.2 ENTREPRENEURSHIP DEVELOPMENT AND MANAGEMENT

L	P
3	-

RATIONALE

In the present day scenario, it has become imperative to impart entrepreneurship and management concepts to students so that a significant percentage of them can be directed towards setting up and managing their own small enterprises. This subject focuses on imparting the necessary competencies and skills of enterprise set up and its management.

COURSE OUTCOMES

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

CO1: Comprehend the importance of entrepreneurship and its role in nation's development.
CO2: Classify the various types of business and business organizations.
CO3: Identify the various resources / sources and / or schemes for starting a new venture.
CO4: Explain the principles of management including its functions in an organisation.
CO5: Conduct market survey and prepare project report.

DETAILED CONTENTS

UNIT I

Entrepreneurship: Concept and definitions, classification and types of entrepreneurs, entrepreneurial competencies, Traits / Qualities of entrepreneurs, manager v/s entrepreneur, role of Entrepreneur, barriers in entrepreneurship, Sole proprietorship and partnership forms of business organisations, small business vs startup, critical components for establishing a start-up, Leadership: Definition and Need, Manager Vs leader, Types of leadership

UNIT II

Definition of MSME (micro, small and medium enterprises), significant provisions of MSME Act, importance of feasibility studies, technical, marketing and finance related problems faced by

new enterprises, major labor issues in MSMEs and its related laws, Obtaining financial assistance through various government schemes like Prime Minister Employment Generation Program (PMEGP) Pradhan Mantri Mudra Yogna (PMMY) , Make in India, Start up India, Stand up India , National Urban Livelihood Mission (NULM); Schemes of assistance by entrepreneurial support agencies at National, State, District level: NSIC, NRDC, DC:MSME, SIDBI, NABARD, Commercial Banks, SFC's TCO, KVIB, DIC, Technology Business Incubator (TBI) and Science and Technology Entrepreneur Parks (STEP).

UNIT III

NATURE AND FUNCTIONS OF MANAGEMENT: Definition, Nature of Management, Management as a Process, Management as Science and Art, Management Functions, Management and Administration, Managerial Skills, Levels of Management; Leadership.

PLANNING AND DECISION MAKING: Planning and Forecasting - Meaning and definition, Features, Steps in Planning Process, Approaches, Principles, Importance, Advantages and Disadvantages of Planning, Types of Plans, Types of Planning, Management by Objective. Decision Making-Meaning, Characteristics.

UNIT IV

ORGANISING AND ORGANISATION STRUCTURE: Organising Process - Meaning and Definition, Characteristics Process, Need and Importance, Principles, Span of Management, Organisational Chart - Types, Contents, Uses, Limitations, Factors Affecting Organisational Chart.

STAFFING: Meaning, Nature, Importance, Staffing process. Manpower Planning, Recruitment, Selection, Orientation and Placement, Training, Remuneration.

CONTROLLING AND CO-ORDINATION Controlling - Meaning, Features, Importance, Control Process, Characteristics of an effective control system, Types of Control. Co-ordination - characteristics, essentials.

UNIT V

Market Survey and Opportunity Identification, Scanning of business environment, Assessment of demand and supply in potential areas of growth, Project report Preparation, Detailed project report including technical, economic and market feasibility, Common errors in project report preparations, Exercises on preparation of project report.

RECOMMENDED BOOKS

1. BS Rathore and Dr JS Saini, "A Handbook of Entrepreneurship", Aapga Publications, Panchkula (Haryana).
2. Entrepreneurship Development, Tata McGraw Hill Publishing Company Ltd., New Delhi.
3. CB Gupta and P Srinivasan, "Entrepreneurship Development in India", Sultan Chand and Sons, New Delhi.
4. Poornima M Charantimath, "Entrepreneurship Development - Small Business Enterprises", Pearson Education, New Delhi.
5. David H Holt, "Entrepreneurship: New Venture Creation", Prentice Hall of India Pvt. Ltd., New Delhi.
6. PM Bhandari, "Handbook of Small Scale Industry".
7. L M Prasad, "Principles and Practice of Management", Sultan Chand & Sons, New Delhi.

RECOMMENDED WEBSITES

1. https://ipindia.gov.in/

INSTRUCTIONAL STRATEGY

Some of the topics may be taught using question/answer, assignment or seminar method. The teacher will discuss stories and case studies with students, which in turn will develop appropriate managerial and entrepreneurial qualities in the students. In addition, expert lecturers may also be arranged from outside experts and students may be taken to nearby industrial organizations on visit. Approach extracted reading and handouts may be provided. In addition, different activities like conduct of entrepreneurship awareness camp extension lecturers by outside experts, interactions sessions with entrepreneurs and industrial visits may also be organized. This subject contains five units of equal weightage.

6.3 PROGRAMME ELECTIVE – II
6.3.1 ADVANCED YARN MANUFACTURING

L	P
3	-

RATIONALE

The student of diploma in textile technology must be familiar with the new systems of yarn manufacturing used in modern industry. This subject will help the students to learn about latest spinning systems along with working of different parts. This subject will further expose the students to yarn formation in air-jet and friction spinning along with man-made fibers.

COURSE OUTCOMES

After undergoing the subject, the students will be able to:
CO1: Learn about the need of new spinning systems
CO2: Study important parts of Rotor Spinning Machine
CO3: Understand principles and properties of air-jet spinning.
CO4: Explain advantages and disadvantages of friction spinning
CO5: Acquire knowledge about man-made fiber / filament production

DETAILED CONTENTS

UNIT-I
Introduction and advantages of new spinning systems
Advent of new spinning systems due to limitations of ring spinning
Principle of open end spinning

UNIT-II
Important parts of Rotor Spinning Machine
Passage of material and working of Rotor Spinning Machine
Fibers Requirement and range of count for Rotor Spinning
Specifications of Rotor Spinning Machine

Properties and application of rotor spun yarn

UNIT-III

Principle of yarn formation in Air-jet spinning
Advantages and limitations of Air-jet spinning
Properties and application of air-jet spun yarn

UNIT-IV

Principle of yarn formation in Friction spinning
Advantages and limitations of Friction Spinning
Properties and application of friction spun yarn
Comparison of Ring, Rotor, Air-jet and Friction spun yarn

UNIT-V

Introduction to man-made fiber/ filament production
Brief idea of melt, dry and wet spinning of man-made fiber/ filament
Introduction to post spinning operation in man-made fiber/ filament production Objects of drawing and heat setting
Introduction and objects of texturing process.
Brief idea of different texturing processes
Advantages and application of textured yarn

RECOMMENDED BOOKS

1. Manual of Textile Technology (Vol.5 and Vol.6) by W Klein
2. Open End Spinning by V. Rohlena
3. Spun Yarn Technology by Venktasubramanian
4. Production of synthetic fibers by A. A Vaidya

RECOMMENDED WEBSITES

1. https://textilelearner.net/modern-and-new-spinning-
2. https://archive.nptel.ac.in/courses/116/102/116102059/
3. https://archive.nptel.ac.in/courses/116/102/116102053/
4. https://textilestudycenter.com/man-made-fibre-production/

INSTRUCTIONAL STRATEGY

This is a theory based subject and contains five units of equal weight age each.

6.3.2 ADVANCED KNITTING TECHNOLOGY

L	P
3	-

RATIONALE

Textile Technology diploma students are also expected to get placement in knitting industries. So they are expected to have knowledge advanced operations of knitting industries. This subject will expose the students towards and historical developments of knitting technology. It will further help the students to learn warp knitting, advanced knitting structure and applications

COURSE OUTCOMES

After undergoing the subject, the students will be able to:
CO1: Learn about advancement in knitting technology
CO2: Study warp knitting and its applications
CO3: Explain warp knitting structure in detail
CO4: Understand the concept of advanced knit structure
CO5: Explore various applications of advanced knitting

PRACTICAL EXERCISES

UNIT I

Introduction

Historical developments of knitting technology, Overview of the knitting technology advancement, Fundamental of weft knitting: Basic weft knit structures and their properties, Structural parameters of knitted structures such as course, wales, stitch length, stitch density, machine gauge, tightness factor.

UNIT II

Warp Knitting

Introduction to warp knitting and its application, swinging and shogging motion (underlap and overlap), closed lap and open lap, warp Knit Fabric Notation- Lapping Diagram and Lapping

Plan, Brief description of Tricot and Raschel warp knitting machines, function of sinker bar, guide bar, needle bar.

UNIT III

Warp Knit Structure

Introduction on pattern chain/link arrangement, practice on lapping diagram of basic warp knit structures such as Net, Inlaid, Loop/pile, Lockknit, reverse lockknit, Sharkskin, Queenscord.

UNIT IV

Advanced Knit Structure

Introduction on jacquard and intarsia design, basic techniques to create advance knit structures such as loop shifting, racking mechanism, cable, pointelle, widening, Distinct narrowing, inlay techniques, plaiting.

UNIT V

Applications of Advance Knitting

Innovative applications of advanced knitted fabrics in fashion, sportswear, and technical textiles, Integration of smart textiles and wearable technology in knitted garments, Challenges in Advanced knitting technology.

RECOMMENDED BOOKS

1. Knitting Technology: A Comprehensive Handbook and Practical Guide (Woodhead Publishing Series in Textiles) by David J Spencer
2. Advanced Knitting Technology (The Textile Institute Book Series) –by Subhankar Maity (Editor), Sohel Rana (Editor), Pintu Pandit (Editor), Kunal Singha (Editor)

RECOMMENDED WEBSITES

1. https://youtube.com/playlist?list=PLp6ek2hDcoNBzc20hIpcFqLJjLRYlHWti&feature=shared
2. https://archive.nptel.ac.in/courses/116/102/116102008/
3. https://garmentsmerchandising.com/advanced-knitting-high-performance/

INSTRUCTIONAL STRATEGY

This is a theory based subject and contains five units of equal weight age each.

6.4 COMPUTER APPLICATIONS IN TEXTILE TECHNOLOGY

L	P
-	4

RATIONALE

Students should be capable to run and implement various application software's used in the designing and operating textile machines. Since some highly priced machines cannot be purchased, students should be taken to mills where these machines are working e.g. CAM etc.

COURSE OUTCOMES

After undergoing the subject, the students will be able to:
CO1: Practice software related to textile technology
CO2: Sight demonstration of CAD for textile technology
CO3: Handle textile technology related computer networking
CO4: View demonstration of CAM processes

DETAILED CONTENTS

UNIT I

Practice on any textile based software such as, Wonder Weave, Scot Weave,
Ned Graphics (dobby, jacquard, simulation, knitting software) etc.

UNIT II

Demonstration of various CAD software for Computer Aided card Designing.
Introduction to coral draw/ Photoshop (latest)

UNIT III

Demonstration of computer networking, its uses and applications in Textile Technology machines

UNIT IV

Demonstration of CAM-Computer Aided Manufacturing through visit to mills where such machines are in use.

RECOMMENDED BOOKS

1. User manual of Corel Draw
2. User Manual of Adobe photoshop.

RECOMMENDED WEBSITES

1. https://youtube.com/playlist?list=PLp6ek2hDcoNBzc20hIpcFqLJjLRYlHWti&feature=shared
2. https://archive.nptel.ac.in/courses/116/102/116102008/
3. https://garmentsmerchandising.com/advanced-knitting-high-performance/

INSTRUCTIONAL STRATEGY

This is a practice based subject and contains four units of equal weight age each. Time should be devoted according to depth of the individual software. Students should be taken to those mills where such machines are operative and they should be shown the working of these machines (Automated Machines in Mills).

6.6 MAJOR PROJECT/ INDUSTRIAL TRAINING

L	P
-	18

RATIONALE

Major project/Industrial Training work will help in developing the relevant skills among the students as per National Skill Qualification Framework. It aims at exposing the students to the present and future needs of various relevant industries. It is expected from the students to get acquainted with desired attributes for industrial environment. For this purpose, students are required to be involved in industrial training / Major Project Work in different establishments.

COURSE OUTCOMES

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

CO1: Define the problem statement of the Industrial training / Major project according to the need of industry.
CO2: Work as a team member for successful completion of Industrial training / Major project.
CO3: Write the Internship / Major project report effectively.
CO4: Present the Internship / Major project report using PPT.

GUIDELINES

Depending upon the interest of the students, they can go for Industrial training / Major project as per present and future demand of the industry. The supervisors may guide the students to identify their project work and chalk out their plan of action well in advance. As an Industrial training / Major project activity each student is supposed to study the operations at site and prepare a detailed project report of the observations/processes/activities. The supervisor may create a group of 4-5 students as per their interest to work as a team for successful completion of the Industrial training / Major Project.

The supervisor shall evaluate the students along with one external industry / academic expert by considering the following parameters:

	Parameter	**Weightage**
I	Defining problem statement, focus and approach	20%
ii	Innovation / creativity	20%
iii	Report Writing	20%
iv	Power Point Presentation	20%
v	Viva - voce	20%

24. ASSESMENT TOOLS AND CRITERION

The assessment is carried out by conducting:

1. Formative assessments
2. Summative assessments

1. FORMATIVE ASSESSEMENT

The formative assessment will be evaluated on the basis of the internal assessments for theory subjects and practical by the concerned teachers for evaluating the knowledge and skill acquired by students and the behavioral transformation of the students. This internal assessment is primarily carried out by collecting evidence of competence gained by the students by evaluating them at work based on assessment criteria, asking questions and initiating formative discussions to assess understanding and by evaluating records and reports, and sessional marks are awarded to them.

2. SUMMATIVE ASSESSMENT

The summative assessment will include end semester examination for theory part for each candidate and practical examination with viva voice. Each Performance Criteria will be assigned marks proportional to its importance and proportion of marks for Theory and Skills Practical for each subject should be laid down. The following assessment tools are used for effective student evaluation:

1. Theory
2. Practical
3. Minor & Major Project
4. Massive Open Online Courses (MOOCs)
5. Viva Voce
6. Industrial / In House Training
7. Professional Industrial Training

1. Theory Assessment

Evaluation in theory aims at assessing students' understanding of concepts, principles and procedures related to a course/subject, and their ability to apply learnt principles and solve

problems.

The formative evaluation for theory subjects may be caused through

i. Sessional /class-tests,
ii. Quizzes,
iii. Assignments,
iv. Seminars / Presentations
v. Attendance
vi. Case Studies

For Summative evaluation of theory, the question paper may comprise of three sections.

i. It should contain objective type question and multiple choice questions. The objective type items should be used to evaluate students' performance in knowledge, comprehension and at the most application domains only.

ii. It should contain short answer questions.

iii. Descriptive type questions, with some internal choice of the questions set may be given in this section

2. Practical Assessment

Evaluation of students performance in practical work (Laboratory experiments, Workshop practical /field exercises) aims at assessing students ability to apply or practice the concepts, principles and procedures, manipulative skills, ability to observe and record, ability to interpret and draw conclusions and work related attitudes. This will comprise of a creation of mock environment, wherever applicable in the skill lab which is equipped with all required equipment for development of desired skills. Candidate's soft skills, communication, aptitude, safety consciousness, quality consciousness etc. will be ascertained by observation and will be marked in observation checklist along with the assessment of Job carried out in labs and maintenance of Lab Record Files.

Formative and summative evaluation may comprise of weight ages to performance on task, quality of product, general behavior and it should be followed by viva-voce of the

relevant subject. The end product will be measured against the specified dimensions and standards to gauge the level of skill achievements

3. Minor and Major Project Assessment

The purpose of evaluation of project work is to assess student's ability to apply, in an integrated manner, knowledge and skills in solving real life problems, manipulative skills, ability to observe, record, creativity and communication skills. The project work assigned should be of relevance to the core skill, state of the art topics and the project areas that are pertaining to enhance job skill and enhance occupational opportunities. For both, minor and major project, Formative and summative evaluation may comprise of weight ages to performance on task, quality of product, nature and relevance of project and general behavior.

The formative assessment should include the continuous assessment based on the work allocated and mid semester viva voice or presentation. The final assessment will be the combination of the project undertaken, report submission and should be followed by viva-voce of the relevant subject.

In case of the assessment of this component, the team of examiners should be constituted and half of the examiners in the team should be invited from outside of the institute as expert for conducting the examination.

4. Massive Open Online Courses (MOOCs) Assessment

Open Elective and Multi-Disciplinary Elective may be covered through Massive Open Online Courses (MOOCs) to promote self learning. These platforms promise open, online courses to massive numbers of students as they are free to join; they provide a wide range of courses. They allow for space and time flexibility and their participants can benefit from various online communication tools and access to quality content.

The coordinating Department/Centre/Office shall monitor every student to adopt the courses online of their choice and preference on Swayam portal. The duration of courses will vary depending on the level and credit points. Courses offered in the duration of 4-10 weeks for 2 to 3 credits at diploma level are to be opted. Students can get a certificate after registering and attending the classes and submitting the assignments/quizzes and qualifying nationwide conducted written exam.

On successful completion of each course, the institution offering the MOOCs course would issue the certificate, along with the number of credits and grades, through which the student can get credits transferred into his marks certificate issued by the parent institution. There may be standard norms for the host Institution to conduct the course that may include continuous evaluation through assignments, online quizzes, case studies, online writing exercises, term examinations, student feedback, online forum management, etc. The coordinating Department/Centre/Office of the respective department shall monitor every student and submit to the Office of Examinations, a score sheet before the close of the even semester.

5. Viva Voce Assessment

This tool will be used to assess the conceptual understanding and the behavioral aspects as regards the job role and the specific task at hand. It will also include questions on safety, quality, environment and equipment's etc. Ask questions on non-prescribed tasks to ensure that the learners have complete knowledge on the assessment

6. Industrial / In-house Training Assessment

The two mandatory internships after First and Second Year of are to be assessed in 3rd and 5th semester subsequently. The training should be preferably done in the industry but can also be in house depending upon the stream and availability of resources in and around the institute. Faculty should be assigned each student and made responsible for the evaluation and assessment of the training. Formative assessment should be taken from the industry/institute/ department on the basis of performance, behavior and learning capabilities. Summative evaluation may comprise of weight ages on the basis of report submission / presentation followed by viva-voce of the relevant subject.

7. Professional Industrial Training Assessment

Evaluation of professional industrial training report and viva-voce/ presentation aims at assessing students' understanding of industrial processes, practices in the industry/field and their ability to engage in activities related to problem-solving in industrial setting as well as understanding of application of learnt knowledge and skills in real life situation. Formative and summative evaluation may comprise of weight ages to performance on task, quality of product, general behavior and it should be followed by viva-voce of the relevant subject.

The formative assessment should include the evaluation from the employer where the student is doing his training in the ratio of 40:60. The final assessment will be the combination of the

employer assessment and evaluation by the faculty of the institute which shall include report submission/ presentation/ seminar followed by viva-voce of the relevant subject.

SGPA AND CGPA ASSESSMENT

The UGC recommends the following procedure to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

i. The SGPA is the ratio of sum of the product of the number of credits with the marks scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e

$$SGPA\ (Si) = \sum(Ci \times Gi) / \sum Ci$$

where Ci is the number of credits of the ith course and Gi is the marks scored by the student in the ith course.

ii. The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.

$$CGPA = \sum(Ci \times Si) / \sum Ci$$

where Si is the SGPA of the ith semester and Ci is the total number of credits in that semester.

iii. The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

25. TEACHING LEARNING TOOLS FOR EFFECTIVE IMPLEMENTATION

For effective implementation of curriculum, the faculty and staff of institutions have to play a vital role in planning instructional experiences for the courses in four different environments viz. class-room, laboratory, library and field and execute them in right perspective. It is emphasized that only a proper mix of different teaching methods in all these places of instruction can bring the changes in students behaviour as stipulated in the curriculum document. It is important to understand curriculum document holistically and further be aware of intricacies of Teaching-Learning Tools for achieving curriculum objectives. Given below are certain recommendations which may help in carrying out teaching-learning effectively:

PROGRAMME LEVEL RECOMMENDATIONS

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

2. An academic plan needs to be prepared at institute level. The Head of the institute has a great role to play in its dissemination and percolation up to grass-root level.

3. Heads of Department are required to prepare academic plan at department level referring to institutional academic plan.

COURSE LEVEL RECOMMENDATIONS

Teachers are educational managers at class room level and their success in achieving course level objectives lies in using course plan and their judicious execution which is very important for the success of programme by achieving its objectives. Teachers are required to plan various instructional experiences viz. theory lecture, expert lectures, lab/workshop practical's, guided library exercises, field visits, study tours, camps etc. In addition, they have to carry out progressive assessment of theory, assignments, library, practical's and field experiences. Teachers are also required to do all these activities within a stipulated period which is made available to them in the academic plan at Board level. With the amount of time to their credit, it is essential for them to use it judiciously by planning all above activities properly and ensure

execution of the plan effectively. Following is the gist of suggestions for subject teachers for effective utilization of Teaching Learning Tools to achieve the course objectives:

1. Teachers need to ensure attainment of course outcomes so as to help the students achieve program outcomes and also meet the desired learning outcomes in five domains of NSQF i.e. Process, Professional knowledge, Professional skills, Core skills and Responsibility.

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

3. Teachers are required to prepare lesson plan for every theory class. This plan may comprise of contents to be covered, learning material for execution of a lesson plan.

4. Teachers are required to plan for expert lectures from field/industry. For this, necessary steps need to be taken such as planning in advance, identifying field experts, making correspondence to invite them, taking necessary budgetary approval etc.

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

6. Concept based industrial/field visits may be planned and executed for such contents of course which are abstract in nature and no other requisite resources are readily available in institute to impart them effectively.

7. Lot of focus needs to be laid on skill development. There is need for planning practical experiences in right perspective. These slots in a course are the avenues to use problem based learning and experiential learning effectively. The development and use of lab manuals will enable the institutes to provide lab experiences effectively.

8. Emphasis should to laid on developing soft skills like communication skills, personality Development, self-learning, inter personal skills, problem solving, and creativity etc.

9. Where ever possible, it is essential to use activity based learning rather than relying on delivery based conventional teaching all the time. While teaching, the teacher should make extensive use of audio visual aids such as video films, power point presentations and IT tools.

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

11. To enhance digital learning, open electives and multi-disciplinary electives have been provided in the curriculum to be taken up in the form of MOOCs. For Open electives, some courses may be identified out of the prescribed list given in the curriculum keeping in mind the interest of students. Similarly, for multi-disciplinary electives, courses to be offered may be identified by considering their relevance and utility. Every year SWAYAM is notifying the list of courses which are going to be offered in forthcoming even and odd semester. The institute needs to select the courses that are offered on SWAYAM platform or any other online platform.

12. For effective implementation of Massive Open Online Courses (MOOCs), a faculty member in the department may be identified and given the responsibility to coordinate various activities related to MOOCs. The concerned faculty member will facilitate in registration of students for MOOCs. The faculty member will also be responsible for compiling the result of students on the completion of MOOCs and pass on the information to the concerned authority.

13. Flexibility has been provided in the curriculum for the students to choose a course related to the discipline as per their interest. For effective implementation of discipline-specific electives, the institute should identify some courses from the list of courses prescribed in the curriculum. The courses should be selected and offered keeping in mind the interest of students, infrastructure and expertise available in and around the institute related to the courses. Option for discipline-specific elective may be taken from students through a form and a course, with more than 10 students opting for it, may be run.

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

15. Any relevant contents beyond the syllabus may be covered by the teacher or experts in extra time.

16. Minor project should be identified and allocated taking into consideration the inputs from industry stake-holders, and departmental faculty. The minor project work should be such

that it enhances the fundamental skill-sets of the students from industry perspective and subsequently helps them to handle major project.

17. For major project work, students may be given relevant and well thought out problems, which are purposeful and develop practical skills. This will help the students in developing creativity and confidence for their gainful employment.

18. A Project bank may be developed in consultation with related industry, research institutes and other relevant field organizations. It may be ensured that that the students take up some live problems being faced by industry as part of project work.

26. LIST OF EXPERTS

1. Controller of Examination, Haryana State Board of Technical Education, Panchkula.
2. Controller of Administration & Finance, Haryana State Board of Technical Education, Panchkula.
3. Joint Secretary, Haryana State Board of Technical Education, Panchkula.
4. Deputy Secretary, Training & Placement, Haryana State Board of Technical Education, Panchkula.
5. Deputy Secretary, Examination, Haryana State Board of Technical Education, Panchkula.
6. Deputy Secretary, Academic, Haryana State Board of Technical Education, Panchkula.
7. Assistant Secretary, Academic, Haryana State Board of Technical Education, Panchkula.
8. Dr. Puneet Sood, Director, National Institute of Fashion Technology, Kannur.
9. Dr. Vishu Arora, Associate Professor, Department of Textile Design, National Institute of Fashion Technology, Panchkula.
10. Dr. Lalit Jaipura, Associate Professor, Department of Textile Technology, National Institute of Technology, Jalandhar.
11. Mr. Rajesh Kadian, Senior Lecturer, Department of Textile Technology, Government Polytechnic, Hisar.
12. Mr. Puneet Garg, Senior Lecturer, Department of Textile Technology, Government Polytechnic, Jattal.
13. Mr. KK Chahal, Lecturer, Department of Textile Technology, Government Polytechnic, Hisar.
14. Ms. Shruti Nigam, Founder, Department of Textile Design, Yellow Stitch, Mohali.

15. Ms. Radhika Sen, Creative Associate, Department of Fashion Design, Byju & Whitehatjr, Banglore.
16. Mr. Naveen Bhutani, General Manager, Quality Department, Richa Global Exports Pvt. Ltd., Mansesar, Gurgaon
17. Mr. Balram Maurya, Manager, Marketing and Merchandising, Faridabad, Haryana
18. Sh. Rohit Khanna, Managing Director, KISCO India Private Ltd., Chandigarh.
19. Ms. Vijay Lakshami, Assistant Professor, NIFT Kannur, Kerela
20. Ms. Pallabi Das, Assistant Professor, NIFT Daman Deu
21. Dr. Sangeeta, Ex. Associate Professor, Home Science College, Chandigarh.
22. Ms. Anila, Assistant Professor, Home Science College, Chandigarh.
23. Dr. Amit Madhu, Assistant Professor, TIET, Bhiwani, Haryana.
24. Dr. Sandeep Sachan, Director, NIFT, Daman Deu
25. Mr. Dharmender Sharma, Manager, Department of Production, DCM, Hisar.
26. Mr. Rajinder, Executive, Department of Purchase, Vardhman Textiles Limited, Ludhiana
27. Smt. Pushpa Rani, Senior Lecturer, Applied Science Department, Government Polytechnic, Sonipat, Haryana.
28. Smt. Krishna Bhoria, Lecturer, Applied Science Department, Government Polytechnic, Ambala, Haryana.
29. Smt. Preetpal Kaur, Guest Faculty, Applied Science Department, Government Polytechnic, Ambala, Haryana.
30. Ms. Monika, Lecturer, Applied Science Department, Seth Jai Parkash Polytechnic, Damla, Haryana.
31. Dr. Neena Sharma, English Department, MCM College, Chandigarh.

32. Mr. Satyawan Dhaka, Senior Lecturer, Applied Science Department, Government Polytechnic, Nilokheri.
33. Mrs. Sapna Sang, Lecturer, Applied Science Department, Seth Jai Parkash Polytechnic, Damla.
34. Mr. Ravi Bansal, Lecturer, Applied Science Department, Government Polytechnic, Manesar.
35. Mrs. Kiran, Lecturer, Applied Science Department, Government Polytechnic, Sonepat.
36. Dr. Naveen Jha, Assistant Professor, Department of Mathematics, Government Engineering College, Bharatpur.
37. Dr. Bhajan Lal, Lecturer, Applied Science Department, Government Polytechnic for Women, Sirsa, Haryana.
38. Sh. Anil Nain, Lecturer, Applied Science Department, Government Polytechnic, Hisar, Haryana.
39. Dr. Sarita Mann, Lecturer, Applied Science Department, Government Polytechnic, Ambala, Haryana.
40. Smt. Bindu Verma, Lecturer, Applied Science Department, Seth Jai Parkash Polytechnic, Damla, Haryana.
41. Dr. Vidhi Grover, Lecturer, Applied Science Department, Seth Jai Parkash Polytechnic, Damla.
42. Mr. Tavinder Singh, Lecturer, Applied Science Department, Government Polytechnic, Sirsa.
43. Ms. Sunita Rani, Lecturer, Applied Science Department, Government Polytechnic, Ambala.

44. Dr. KG Srinivasa, Professor CSE, IIIT-Naya Raipur
45. Dr. Pankaj Sharma, Professor, Applied Science Department, NITTTR, Chandigarh.
46. Dr. Ashok Kumar, Associate Professor, Applied Science Department, NITTTR, Chandigarh.
47. Dr. KC Lachhwani, Assistant Professor, Applied Science, NITTTR, Chandigarh.
48. Dr. Rajesh Mehra, Professor and Head, Curriculum Development Centre, NITTTR, Chandigarh.
49. Dr. AB Gupta, Professor & Head, Education & Educational Management Department, NITTTR, Chandigarh.
50. Er. PK Singla, Associate Professor, Curriculum Development Centre, NITTTR, Chandigarh.
51. Dr. SK Gupta, Associate Professor, Curriculum Development Centre, NITTTR, Chandigarh.
52. Dr. Meenakshi Sood, Associate Professor, Curriculum Development Centre, NITTTR, Chandigarh.

27. APPENDIX

Sr. No.	LIST OF EQUIPMENT
1.	Projection Microsope
2.	Fibre Length Testing Machine (Baer Sorter)
3.	Fibre Fineness Testing Machine
4.	Whirling Hygrometer
5.	Electronic Moisture Meter
6.	Trash content Analyser
7.	Analytical Balance
8.	Digital Balance
9.	Digital Yarn Count Balance
10.	Beasley's Yarn Balance
11.	Sliver, Roving Measuring Wrap block
12.	Single Yarn Strength Tester
13.	Lea Strength Tester
14.	Yarn Twist Testers
15.	Wrap reel
16.	Fabric Strength Tester
17.	Fabric Bursting Strength Tester
18.	Fabric Abrasion Tester
19.	Yam Evenness Tester (Electronic)
20.	Crimp Meter
21.	Fabric Air Permeability Tester
22.	Crease Recovery Tester
23.	Pick Glasses
24.	Crock meter
25.	Shirley Stiffness tester
26.	Cone winding machine lab model
27.	Sectional Warping Machine lab model
28.	Automatic Pirn Winding Machine 4 Spindle
29.	Handloom Small Width
30.	Power Loom fitted with drop box lab model
31.	Dobby Machine
32.	Jacquard Machine
33.	Shuttle less Loom small width rapier or air jet
34.	Hand Flat Bed Knitting Machine

35.	Circular knitting machine lab model
36.	Warp knitting machine lab model
37.	Socks knitting machine
38.	Different types of Beaters preferably lab model
39.	Carding machine (miniature card)
40.	Draw frame Lab Model
41.	Simplex machine Lab Model
42.	Ring frame Lab Model
43.	Doubling machine Lab Model
44.	Unilap
45.	Comber Machine
46.	Updated Computers
47.	Laser Printers (desk jet or coloured Printers)
48.	Scanner (Flat bed coloured)
49.	Projector
50.	Smart board display
51.	Air Condition
52.	Software Required: a) Corel Draw illustrator, Photoshop b)Any software related to Woven/Knitting/Printed/garment designs/for example Ned graphics/Textronics/Wilcome DECO STUDIO d) MS Office e) Graphics Application Software Browzwear CLO 3D Optitex Tukateck, Lectra
53.	Electric Heather Dyeing bath/ water bath
54.	Weighing Balance
55.	Electric Heater/ Hot Plate
56.	Drying oven Lab model
57.	Stainless steel glass with ring
58.	Stainless steel beakers

59.	Stainless steel rods
60.	Lab Model hydro extractor machine/ Washing machine
61.	pH Meter
62.	Laboratory model winch dyeing machine
63.	Laboratory Model Jigger dyeing machine
64.	Light box for shade matching
65.	High temperature lab dyeing machine
66.	Screen printing machine
67.	Roller printing machine
68.	Curing machine
69.	Sewing machine
70.	Steam/ drying press
71.	Cutting tools
72.	Embroidery machine
73.	5 thread lock stitch machine


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