COMPETENCY BASED CURRICULUM

DIPLOMA
IN
TEXTILE DESIGN

(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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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 Design**
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	:	**33 : 67**
10.	Project Work	:	**Minor and Major Project**
11.	In-house/Industrial Training	:	**Mandatory after First and Second Year**

2. NSQF GUIDELINES

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.

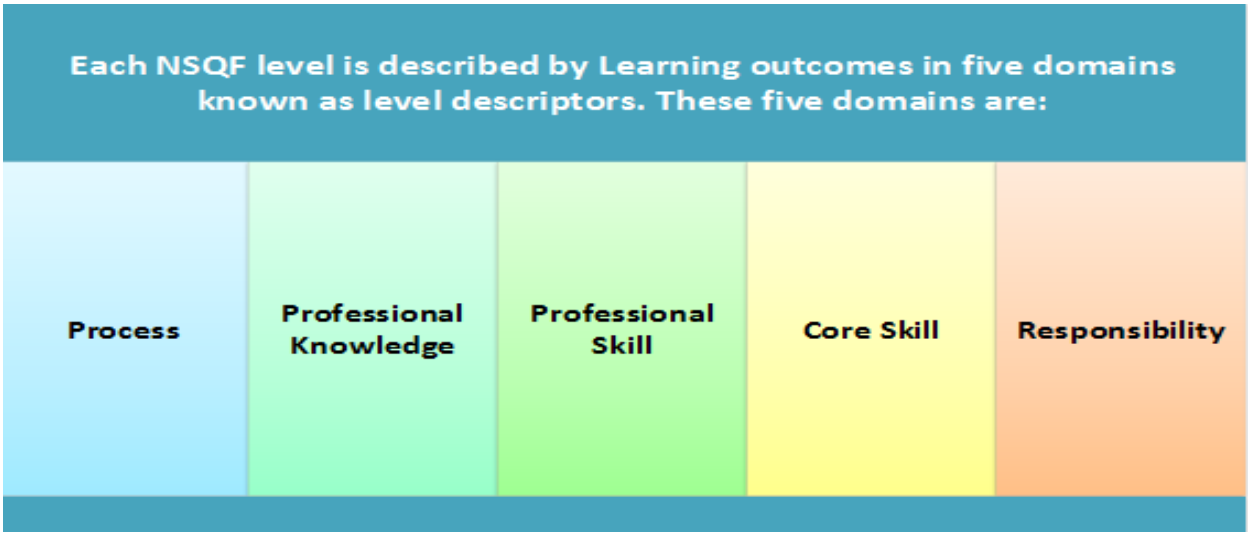

Fig1: NSQF Domains

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.

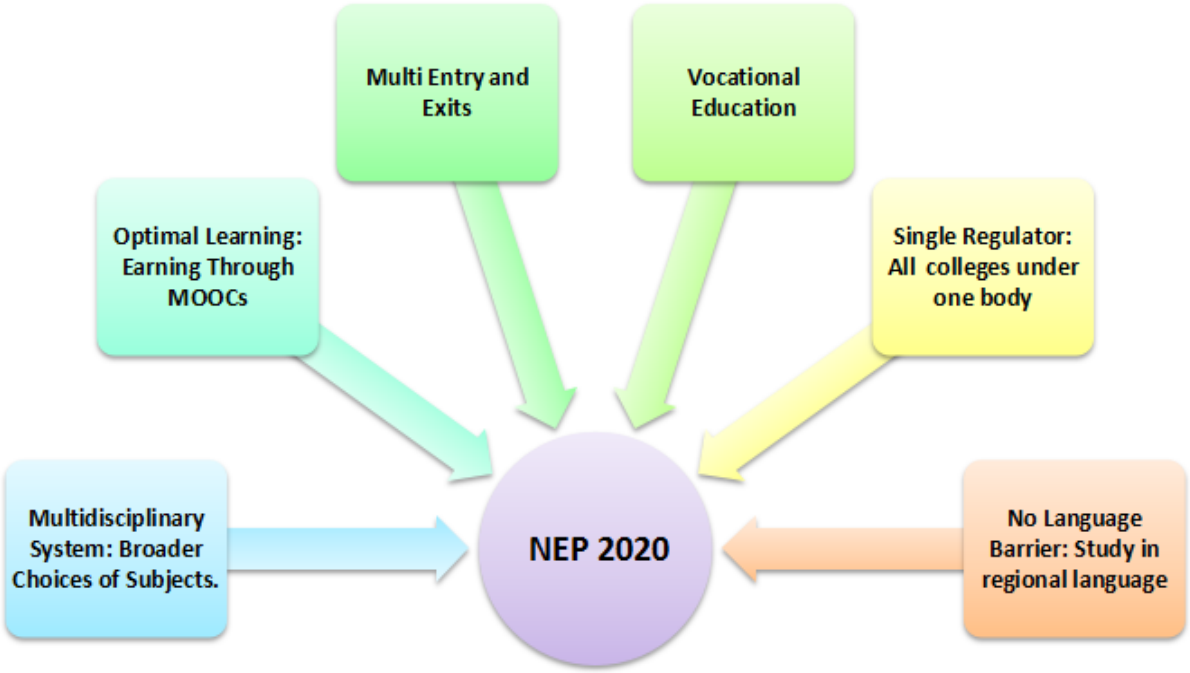

Fig 5: NEP 2020

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 Design.

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 • Basic Design & Colour Texture • Textile Processes • Preparatory Wet Processes • Art Appreciation in Indian Traditional Textile Design • Structural Fabric Design-I • Drawing and Rendering • Weaving Preparation • Basics of Garment Manufacturing Technology • Fabric Manufacture – I • Structural Fabric Design – II • Dyeing Technology – I • Fabric Manufacture – II • Testing and Quality Control – I • Computer Aided Textile Design - II
2.	Acquire knowledge of principles and processes in the field of Textile Design.	• Applied Physics • Applied Chemistry • Textile Processes • Preparatory Wet Processes • Art Appreciation in Indian Traditional Textile Design • Structural Fabric Design-I • Weaving Preparation • Basics of Garment Manufacturing Technology • Fabric Manufacture – I • Structural Fabric Design – II • Textile Mathematics • Dyeing Technology – I • Fabric Manufacture – II • Testing and Quality Control – I • Program Elective - I • Program Elective - II

3.	Develop skills to accomplish quality tasks and solve problems using methods, tools, materials and information**.**	• Basic Design & Colour Texture • Textile Processes • Preparatory Wet Processes • Art Appreciation in Indian Traditional Textile Design • Structural Fabric Design-I • Drawing and Rendering • Weaving Preparation • Basics of Garment Manufacturing Technology • Fabric Manufacture – I • Structural Fabric Design – II • Dyeing Technology – I • Fabric Manufacture – II • Program Elective - I • Program Elective - II • Testing and Quality Control – I • Computer Aided Textile Design - II
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 • Humanities & Life Skills • 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. DIPLOMA PROGRAMME STUDY AND 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 Physics	2	2	2 + 1 = 3	40	40	80	60	60	120	200
1.3	*Applied Chemistry	3	2	3 + 1 = 4	40	40	80	60	60	120	200
1.4	Basic Design & Colour Texture	-	8	0 + 4 = 4	-	40	40	-	60	60	100
1.5	Textile Processes	3	4	3 + 2 = 5	40	40	80	60	60	120	200
1.6	*Environmental Studies & Disaster Management	2	-	2 + 0 = 2	40	-	40	60	-	60	100
# Student Centered Activities(SCA)		-	5	-	-	-	-	-	-	-	-
Total		**12**	**23**	**21**	**200**	**200**	**400**	**300**	**300**	**600**	**1000**

* Common with other Diploma Courses.

** Same as Applied Physics-I and 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	Preparatory Wet Processes	3	4	3 + 2 = 5	40	40	80	60	60	120	200
2.2	Art Appreciation in Indian Traditional Textile Design	3	2	3 + 1 = 4	40	40	80	60	60	120	200
2.3	Structural Fabric Design-I	2	6	2 + 3 = 5	40	40	80	60	60	120	200
2.4	Drawing and Rendering	-	6	0 + 3 = 3	-	40	40	-	60	60	100
2.5	*Fundamentals of IT	2	4	2 + 2 = 4	40	40	80	60	60	120	200
# Student Centered Activities (SCA)		-	3	-	-	-	-	-	-	-	-
Total		**10**	**25**	**21**	**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, 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 Physics	4	-
3.	Applied Chemistry	5	
4.	Basic Design & Colour Texture	8	-
5.	Textile Processes	7	-
6.	Environmental Studies & Disaster Management	2	
7.	Preparatory Wet Processes	-	7
8.	Art Appreciation in Indian Traditional Textile Design	-	5
9.	Structural Fabric Design-I	-	8
10.	Drawing and Rendering	-	6
11.	Fundamentals of IT	-	6
12.	Student Centered Activities	5	3
	Total	**35**	**35**

8. COMPETENCY PROFILE & EMPLOYMENT OPPORTUNITIES

In government and private sectors related to **Textile Design**, **"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 Design.

Textile Design students after NSQF – Level 3 should know the concepts of construction of designs in various styles by using various techniques according to the suitability of various kinds of fabrics on paper with colors. They are also expected to have exposure of different types of light theory and pigment theory of colors. They should know about sources of different natural and manmade fibers along with their physical and chemical properties. They are expected to have good exposure of different fibres, yarns and fabrics and their manufacturing techniques along with process flow.

Textile Design students are expected to have good knowledge of different preparatory wet processes such as shearing, singeing, desizing, scouring, bleaching and mercerization used in modern textile industries. They should know about preparatory treatments on animal and synthetic fibres along with brief idea of dyeing, printing and finishing processes. They are expected to have historical backgrounds of Indian traditional textiles i.e. woven, dyed, printed and embroidered and their development of design. They should be able to demonstrate Skill regarding various basic weaves designs, their drafting and lifting plan constructions and properties of basic weaves. They must have capability to draw various forms of objects from their surroundings and nature from design point of view e.g flowers, leaves, fruits, plants, monuments.

They are expected to recall and demonstrate practical routine and repetitive skills, in narrow range of Textile Design 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 design for wage and self employment.

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

PO4: Communicate in written and oral, with minimum required clarity along with basic understanding of 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 • Apply different color theories. • Select different types of colors. • Prepare a design using different color combination. • Practice principles and elements of design. • Choose textures and styles of designs. • Apply manufacturing process of fibre into yarn. • Practice manufacturing process of yarn into fabric. • Practice principles and objectives of bleaching and mercerization processes. • Apply pre treatment on animal and synthetic fibres.

	• Demonstrate basic knowledge of dyeing, printing and finishing processes. • Practice different kashmiri embroidery, Punjabi phulkari and chikankari. • Prepare kasuti embroidery, brocades and Baluchar embroidery. • Practice plain and twill weaves. • Prepare satin, sateen and other similar weaves. • Develop mock leno and other advance weave designs. • Prepare different opaque and transparent shapes of objects under different mediums. • Design different glazed and rough shapes of objects under different mediums. • Create and practice drapery. • Develop memory drawing. • Practice stylizing the different objects.
PO2: Acquire knowledge of Basic facts, process and principles related to textile design for wage and self-employment.	• Study fibre, filament, yarn and fabric. • Learn source of production of natural fibres and their properties. • Understand man made fibres, their production and properties. • Classify various impurities present in grey natural / synthetic fibres. • Clarify the concept of Desizing and scouring of fibres. • Classify Tangail, Jamdani woven textiles. • Clarify about printed and painted textiles like kalamkari, madhubani. • Learn about resist dyed textiles like ikat, patola, bandhani of Rajasthan and Gujrat. • Study fabric structure. • Learn double cloths.
PO3: Demonstrate practical skill in narrow range of textile design related applications.	• Comprehend heat and temperature scales and measurements and their modes of transfer. • Apply different color theories.

	• Select different types of colors. • Prepare a design using different color combination. • Practice principles and elements of design. • Choose textures and styles of designs. • Apply manufacturing process of fibre into yarn. • Practice manufacturing process of yarn into fabric. • Practice principles and objectives of bleaching and mercerization processes. • Apply pre treatment on animal and synthetic fibres. • Demonstrate basic knowledge of dyeing, printing and finishing processes. • Practice different kashmiri embroidery, Punjabi phulkari and chikankari. • Prepare kasuti embroidery, brocades and Baluchar embroidery. • Practice plain and twill weaves. • Prepare satin, sateen and other similar weaves. • Develop mock leno and other advance weave designs. • Prepare different opaque and transparent shapes of objects under different mediums. • Design different glazed and rough shapes of objects under different mediums. • Create and practice drapery. • Develop memory drawing. • Practice stylizing the different objects.
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. • 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.	• Apply different color theories. • Select different types of colors. • Prepare a design using different color combination. • Practice principles and elements of design. • Choose textures and styles of designs. • Prepare different opaque and transparent shapes of objects under different mediums. • Design different glazed and rough shapes of objects under different mediums. • Create and practice drapery. • Develop memory drawing. • Practice stylizing the different objects.

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 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.

1.3 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.

1.4 BASIC DESIGN & COLOUR TEXTURE

L	P
-	8

RATIONALE

Textile Design students are supposed to know the concepts of construction of designs in various styles by using various techniques according to the suitability of various kinds of fabrics on paper with colors. This subject will provide knowledge of different types of light theory and pigment theory of colors. It will help in understanding of all elements and concepts of design through various exercises.

COURSE OUTCOMES

After undergoing the subject students will be able to:

CO1: Apply different color theories.
CO2: Select different types of colors.
CO3: Prepare a design using different color combination.
CO4: Practice principles and elements of design.
CO5: Choose textures and styles of designs.

PRACTICAL EXERCISES

UNIT 1

Introduction and demonstration of Colour Theory

Rainbow Colours: Make a chart of VIBGYOR colours

Prepare Charts of classification of following colours

i. To construct a design based on primary colours of light theory and pigment theory : (red, yellow and blue) in various geometrical shapes
ii. To construct a design based on secondary colours: Orange, green and violet in circles/ geometrical shapes.
iii. To construct a design based on sub secondary / tertiary colours: by mixing secondary and primary colours in geometrical shapes.
iv. Colour Schemes: Colour Wheel (chromatic circle): Make a wheel showing primary, secondary, sub Secondary intermediate colours.

UNIT II

Achromatic Colours

i. Make a composition of different geometrical shapes in 12″x12″ and paint it with acromatic colours giving it as many colours as possible.

Monochromatic Colours

ii. Make a composition of floral designs in different blocks using as many shades of monochromatic colours as possible.

Methods of Modification of Colours

iii. Make various colours by mixing different colours in different ratios e.g. yellow+blue=green.

UNIT III

Colour Schemes

i. Contrast Colour Scheme: Introduction to various colour harmonies Achromatic Colour Scheme: Arrange different geometrical shapes in 12″x12″ and paint it with achromatic colour
ii. Prepare Monochromatic and Polychromatic colour scheme Analogous colour schème: Transparent and opaque colours
iii. Warm and cool colour

Texture: Texture file with 25 different textures: Use of texture on cloth.

a) Marble b) Spray c) Rubber d) Vegetable e) Brushes f) Coin g) Smoke texture

UNIT IV

Basic elements of drawing and design; and understanding of principles of Designs

i. Rhythm, balance, harmony, unity, emphasis, proportion, colour combination etc.to form a good design.
ii. Introduction to tools and art-material and construction of designs by using basic elements of drawing.
iii. Understanding of construction of designs by using basic geometrical shapes

UNIT V

Understanding of Texture Effects and Understanding of various styles of designs

i. Natural (Realistic) - Abstract - Traditional - Folk – Symbolic.

Change of one style of design to another and Construction and placement of designs on variousbasis - Drop designs (Unit repeating designs) - Half drop designs - Drop reverse designs.

RECOMMENDED BOOKS

1. Dorothy Bosomworth, "The Encyclopaedia of Patterns and Motifs" by Studio London, 1st editin,1955.
2. Jeanne Alen,"Designer's Guide to Colour 3" by Chronicle Books, San Francisco, 1st edition, 1986.
3. Jill Kennedy and Jane Varsall,"Fabric Painting" by BT Batsford Ltd., London, 2nd edition, 1994.
4. Jeanne Allen, "Designer's Guide to Japanese Patterns" by Chronicle Books, San Francisco, 1st edition, 1988.
5. Michael and Pat Rogondino, "Computer Colour-10,000 computer - Generated Process colours" by Angus and Robertson Publishers (Practical reference of colours Processed by Mixing), 1st edition, 1989.
6. HD Murray, "Colour in Theory and Practice" by Chapman and Hall Ltd., 1st edition, Vol. 1, 1952.

SUGGESTED WEBSITES

1. https://onlinecourses.nptel.ac.in/
2. https://swayam.gov.in/

INSTRUCTIONAL STRATEGY

This is hands on practice based subject for development of required skills in the students. This subject contains five units of equal weight age. Mixing and developing of different colour shades may be shown on computer so that the students are able to appreciate the importance of the subject.

1.5 TEXTILE PROCESSES

L	P
3	4

RATIONALE

The students of textile design are supposed to have introductory knowledge and skill related to various fibers, yarns and fabrics. Learn source of different natural and manmade fibers. Students should know the physical and chemical properties of fibres. This subject will give knowledge of different fibres, yarns and fabrics and their manufacturing techniques along with process flow.

COURSE OUTCOMES

After undergoing the subject students will be able to:

CO1: Study fibre, filament, yarn and fabric.
CO2: Learn source of production of natural fibres and their properties.
CO3: Understand man made fibres, their production and properties.
CO4: Apply manufacturing process of fibre into yarn.
CO5: Practice manufacturing process of yarn into fabric.

DETAILED CONTENTS

UNIT I

Definition of fibre, filament, yarn, fabric, classification of textile fibers and physical and chemical identification of textile fibers.

UNIT II

Source and production of cotton, wool, jute, silk fibers, their end uses and physical and chemical properties. Grading of cotton and wool.

UNIT III

Viscose rayon, nylon, polyester, acrylic Polypropylene fibers; their uses and their method of production, physical and chemical properties, and introduction to mixing and blending

UNIT IV

Principles of blow room, carding, drawing/gilling, speed frame, ring frame and doubling and

process flow of cotton, woolen, and worsted systems of yarn manufacture.

UNIT V

Process flow of fabric manufacturing Basic principles of weft and warp knitting and use of knitted fabrics

PRACTICAL EXERCISES

1. Physical and chemical identification of cotton.
2. Physical and chemical identification of, wool.
3. Physical and chemical identification of silk.
4. Physical and chemical identification of nylon.
5. Physical and chemical identification of acrylic.
6. Physical and chemical identification of polyester.
7. Physical and chemical identification of viscose.
8. Study of fiber cross section of cotton,wool, nylon, polyester, silk.
9. Qualitative and quantitative analysis of fibers and their blends.
10. Understanding different spinning process by textile mill visit.
11. Estimation of fibre diameter by projection microscope.
12. Estimation of yarndiameter by projection microscope.
13. Understanding different processes of weaving through textile mill visit.
14. Understanding process of knittingthrough textile mill visit.

RECOMMENDED BOOKS

1. E P G Gohl and L D Vilensky, “Textile science” by CBS Publisher & Distributors, 2nd edition, 1984.
2. Bernard P. Corbman, “Fibre to Fabric” by McGraw Hill Education, 6th edition, 1985.
3. Parul Bhatnagar, “Elementary Textile” by Abhishek Publisher, Chandigarh, 1st edition 2015.
4. Max M. Houck, “Identification of textile fibers” by Wood head Publishing India in Textile, 1st edition 2009.
5. Kaplan, “Textile fibers” Abhishek Publisher, Chandigarh, 1st edition, 2019

SUGGESTED WEBSITES

1. https://onlinecourses.nptel.ac.in/
2. https://swayam.gov.in/

INSTRUCTIONAL STRATEGY

This is 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.

1.6 ENVIRONMENTAL STUDIES AND DISASTER MANAGEMENT

L	P
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 KatariaandSons, 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 PREPARATORY WET PROCESSES

L	P
3	4

RATIONALE

Diploma students of Textile Design should have knowledge of different preparatory wet processes such as shearing, singeing, desizing, scouring, bleaching and mercerization used in modern textile industries. This subject will provide knowledge of preparatory treatments on animal and synthetic fibres and brief introduction of dyeing, printing and finishing processes. It will also give of exposure of all the preparatory and post dyeing processes in schematic manner.

COURSE OUTCOMES

After undergoing the subject students will be able to:

CO1: Classify various impurities present in grey natural / synthetic fibres.
CO2: Clarify the concept of Desizing and scouring of fibres.
CO3: Practice principles and objectives of bleaching and mercerization processes.
CO4: Apply pre treatment on animal and synthetic fibres.
CO5: Demonstrate basic knowledge of dyeing, printing and finishing processes.

DETAILED CONTENTS

UNIT I

Impurities in fibres and grey fabrics (Cotton, Wool, Silk and Polyester fibre) Preparatory sequences required for their removal. Different pretreatment processes for the preparation of cotton fabric such as:

Shearing and cropping – Objective, process involved.

Singeing-: Objectives, Singeing methods: plate, roller and gas singeing, merits and demerits, precautions while singeing.

UNIT II

Desizing- Objectives and Various methods of desizing: (Rot, Acid, Enzyme, Chlorite and Bromire methods), merits and demerits of each method; evaluation of desizing efficiency. Principles and process of scouring of cotton, working of Pressure Kiers

UNIT III

Bleaching - Purpose and different methods of bleaching Cotton using Hydrogen peroxide, Sodium hypochlorite and sodium Chlorite, method of evaluation of bleaching efficiency, application of Optical Brightening agent.

Mercerization- Purpose, fundamentals, physical and chemical changes, mercerization of yarn and fabric. Mercerizing machines – pad chain, pad chainless machines, determination of Barium Activity number.

UNIT IV

Prepatory Treatments on animal and Synthetic fibre:

a. Scouring of Wool (Emulsion & solvent scouring.) & Silk
b. Bleaching of Wool Silk by Hydrogen peroxide sodium hydro sulphite
c. Silk Degumming Process
d. Scouring and bleaching of man-made fibres- polyester, polyamide,

UNIT V

Definition and brief history of dyeing, classification of dyes (natural, mineral and synthetic).

Printing – Objective & Definition, Introduction to styles and method of printing.

Objectives of finishing, Classification of finishes on the basis of mechanical and chemical treatment.

PRACTICAL EXERCISES

1. To desize the given cotton sample by acid steep method.
2. To desize the given cotton sample by enzyme steep.
3. To desize the given cotton sample by rot steep method.
4. To find out desizing efficiency of cotton fabric by weight loss process.
5. To scour the given, the cotton sample.
6. To scour given sample of wool.
7. To bleach the given cotton sample by sodium hypo chlorite.
8. To full bleach a given cotton sample by hydrogen peroxide.
9. To bleach the cotton fabric with bleaching powder.
10. To bleach the given wool sample by hydrogen peroxide.
11. To bleach the given wool sample by sodium hypo chlorite.
12. To bleach the given silk sample by hydrogen peroxide.

RECOMMENDED BOOKS

1. VA Shenai, "Technology of Bleaching and Mercerisation" by Sevak Publication, 6th edition, 1991.
2. RS Prayag, "Technology of printing" by MRS L R Pryag, 3rd edition 2000.
3. BP Corbman, "Fiber to fabric" by Mc Graw Hill Publication, 6th edition 1984.
4. VA Shenai, "Fundamental Principles of textile processing" by Sevak Publication, 2nd edition, 2000.
5. VA Shenai, "Technology of Dyeing" by Sevak Publication, Vol 6, 7th edition, 1996.
6. VA Shenai, "Technology of textile finishing" by Sevak Publication, 7th edition, 1995.
7. WS Murphy, "Textile finishing" by Abhishek Publication, 1st edition 2003.

SUGGESTED WEBSITES

1. https://onlinecourses.nptel.ac.in/
2. https://swayam.gov.in/

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 ART APPRECIATION IN INDIAN TRADITIONAL TEXTILE DESIGN

L	P
3	2

RATIONALE

Historical backgrounds of Indian traditional textiles i.e. woven, dyed, printed and embroidered and their development of design, fabric uses and technical details are very important for textile design students. This subject will give exposure of methods, center of production, motifs and styles of Indian traditional textiles. It will give knowledge about color and textures of various traditional textiles.

COURSE OUTCOMES

After undergoing the subject students will be able to:

CO1: Practice different kashmiri embroidery, Punjabi phulkari and chikankari.
CO2: Prepare kasuti embroidery, brocades and Baluchar embroidery.
CO3: Classify Tangail, Jamdani woven textiles.
CO4: Clarify about printed and painted textiles like kalamkari, madhubani.
CO5: Learn about resist dyed textiles like ikat, patola, bandhani of Rajasthan and Gujrat.

DETAILED CONTENTS

UNIT I

Study of Indian embroidered textiles with reference to textiles with reference to

a) Historical significance
b) Construction techniques
c) Styles
d) Textures, colour and
e) Motifs
f) Centres of production
    i. Different Kashmir embroidery
    ii. Panjabi Phulkari
    iii. UP Chikan Kari

UNIT II

Study of Indian embroidered textiles with reference to textiles with reference to

a) Historical significance
b) Construction techniques
c) Styles
d) Textures, colour and
e) Motifs
f) Centres of production
   i. Karnataka Kasuti
   ii. Brocades Banaras
   iii. Baluchar

UNIT III

Study of Woven textiles with reference to:

a) Historical significance
b) Construction techniques (Including raw materials)
c) Styles, colour and motifs
d) Centres of production
   Tangail - Jamdani

UNIT IV

Study of printed and painted textiles with reference to:

a) Historical significance
b) Printing Techniques
c) Styles, colour and dyes and motifs
d) Centres of production
   i. Kalamkari
   ii. Madhubani

UNIT V

Study of resist dyed textiles with reference to:

a) Historical significance
b) Dyeing techniques
c) Styles, colour and Motifs
d) Centres of Production
   i. Ikat , Patola
   ii. Bandhani of Rajasthan and Gujrat

PRACTICAL EXERCISES

1. Replication of Kashmir embroidery design and presentation of assignments.
2. Replication of Punjabi phulakri and presentation of assignments.
3. Replication of chikankari and presentation of assignments.
4. Replication of kasuti of Karanatka embroidery and presentation of assignments.
5. Replication of Banaras brocades and presentation of assignments.
6. Replication of Baluchar embroidery and presentation of assignments.
7. Replication of Tangail, Jamdani woven textiles and presentation of assignments.
8. Replication of andkalamkari and presentation of assignments.
9. Replication of madhubani and presentation of assignments.
10. Replication of ikat and presentation of assignments.
11. Replication of patola and presentation of assignments.
12. Replication of bandhani of Rajasthan and Gujrat and presentation of assignments.

RECOMMENDED BOOKS

1. Chetna Desai Ikat, “Textile of India” by Chronicle books, 1st edition, 1988.
2. Sukla Das, “Fabric Art heritage of India” by Abhinav Publication, 1st edition, 1992.
3. Veronica Murphy, “Tie Dyed Textile of India” by Rizzoli Publishers, 1st edition, 1991.
4. John Gillow, “Traditional Indian Textiles” by Thames and Hudson, 1st edition, 1991.
5. Kyoto Shoin, “Textile Art of India” by Kokyohatanaka Collections, 1st edition, 1993.

SUGGESTED WEBSITES

1. https://onlinecourses.nptel.ac.in/
2. https://swayam.gov.in/

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. Art galleries and museums visit must be included to prepare replicas.

2.3 STRUCTURAL FABRIC DESIGN-I

L	P
2	6

RATIONALE

Skill regarding various basic weaves designs, their drafting and lifting plan constructions and properties of basic weaves is required in the students. They are expected to know the derivatives of basic weaves. The subject will provide knowledge of different methods of weaves employment to acquire competency for production of basic and advance woven designs.

COURSE OUTCOMES

After undergoing the subject students will be able to:

CO1: Study fabric structure.
CO2: Practice plain and twill weaves.
CO3: Prepare satin, sateen and other similar weaves.
CO4: Develop mock leno and other advance weave designs.
CO5: Learn double cloths.

DETAILED CONTENTS

UNIT I

Introduction to fabric structure, explanation of woven structures and other fabric structures for example knitted, non-woven, bonded and embroidery, crochet and needle work. Definition of warp and weft, ends and picks, design, repeat of a design, crochet, Needle work, draft, lifting or peg plan and denting order. Design representation on graph paper. Types of drafts and their uses in the manufacture of various fabrics.

UNIT II

Construction of plain weave and its derivatives in the form of simple matt or Hopsack and ribbed structure. Ornamentation of plain weave by different methods Construction of Twill weaves and their derivatives - Regular twills, pointed twills, Broken twills, Combined twills, Low twills and high twills.

UNIT III

Characteristics and uses of satin and sateen weaves, construction of regular and irregular satin and sateen. Diamond weaves and their construction, Simple honey comb, brighten honey comb, huckaback, sponge and similar weaves.

UNIT IV

Mock leno weave and distorted thread effects. Construction of bed ford cord and wadded bed ford. Welts and piques, plain pique backed pique, backed fabrics, warp and weft backed fabrics, wadded warp and weft backed fabrics their beaming and drafting procedure.

UNIT V

Double cloth- self stitched double cloth, reversible self-stitched double cloths, selection of suitable stitching position, wadded double cloths. Center stitched double cloths-center warp stitching, center weft stitching. Introduction of the tubular fabric and treble cloths and fabric opening to double width

PRACTICAL EXERCISES

Following weaves to be constructed on Graph Paper

1. Construction of Plain weave
   a. Rib weave - regular and irregular
   b. Cord weave - regular and irregular
   c. Hopsack weave
2. Construction of Twill weave
   a. Warp faced twill
   b. Weft faced twill
   c. Reversible twill
3. Preparation of samples of plain and twill weave
   a. Napkin
   b. Theme combination of basic weaves
   c. Method Hand loom
   d. Placement checks or stripes
   e. Colour scheme two colour for warp and two colour for weft
4. Identification of fabrics structures regarding weaving, knitting crochet, embroidery, Needle work etc.
5. Drafting and denting of warp for weaves studied in theory
6. Construction of pointed and diagonal weave, satin and sateen weaves – regular and Irregular

7. Construction of Honey comb weave and brighten honey comb
8. Construction of Hucka back weave
9. Construction of Mock leno weave as on following samples

Table Mat
Theme: Motif design with binding weave
Warp count 2/24 s
Cushions
Weave in combination with plain weave
Placement square on rectangle blocks
warp count 2/10 s or 2/20s
Weft yarn Fancy material

10. Drafting and denting of warp for weaves studied in theory
11. Study of effect of structure of cloth by changing denting plan
12. Study of effect of change in structure by varying lifting plan
13. Analysis of double cloth fabric.

RECOMMENDED BOOKS

1. Z J Grosicki, "Watson's Advance Textile Design" by Woodhead Publication, 4th edition 1913.
2. Z J Grosicki, "Watson's Textile Design and Colour by Woodhead Publication, 9th edition 1912.
3. N Gokarneshan, "Fabric Structure and Design" by New age International, 2nd edition 2004.
4. Doris Goerner, "Woven Structures and Design" by British Textile Technology Group WIRA House, Leeds (UK), 5th edition, 1988.
5. M G Mahadevan, "Textile Spinning Weaving And Designing" by Abhishek Publications, Chandigarh, 1st edition 2001.
6. Shenton Jan "Woven Textile Design" by Laurence King Publishing, 1st edition, 2014

SUGGESTED WEBSITES

1. https://onlinecourses.nptel.ac.in/
2. https://swayam.gov.in/

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 DRAWING AND RENDERING

L	P
-	6

RATIONALE

Textile design students are required to draw various forms of objects from their surroundings and nature from design point of view e.g flowers, leaves, fruits, plants, monuments etc. The translation of ideas into practice without the use of this graphic language is really beyond imagination. This subject will include outdoor sketching.

COURSE OUTCOMES

After undergoing the subject students will be able to:

CO1: Prepare different opaque and transparent shapes of objects under different mediums.
CO2: Design different glazed and rough shapes of objects under different mediums.
CO3: Create and practice drapery.
CO4: Develop memory drawing.
CO5: Practice stylizing the different objects.

PRACTICAL EXERCISES

UNIT I

1. To draw different opaque objects and do them in the given medium by pencil shading
2. To draw different transparent objects and do them in the given medium by pencil shading
3. To draw different round shapes like (pot, kettle, ball etc) and do them in the given medium by pencil shading.
4. To draw different square shapes like (match box, duster, big and small boxes) and do them in the given medium by pencil shading.

UNIT II

1. To draw different shaped objects like glazed surface.
2. To draw different shaped objects like rough surface.
3. To study the objectives and use of different mediums.

UNIT III

1. To study different folds of drapery with any background by pencil shading.
2. To study different folds of drapery with any background by black pen and ink

UNIT IV

1. To make a drawing using one's memory.

UNIT V

1. To stylize different objects studied.
2. To form a composition using different styles.

RECOMMENDED BOOKS

1. A Walter foster, "How to draw and paint" by E.D. Galgotia and sons, 4th edition, 2007.
2. A. Walter foster, "Flowers and still life" byA E.D. Galgotia and sons, 3rd edition, 2017.
3. A Walter foster, "How to draw and paint textures of animals" by E.D. Galgotia and sons, 4th edition, 1988.
4. Barrington barber, "The fundamentals of Drawing" by Arcturus Publishing Limited, 5th edition illustrated, 2001.
5. Jasminasusak, "Drawing for beginners" by Create space Independent, 3rd edition, 2018.
6. William F Powell, "Learn to draw step by step (Drawing Tress), Books Wagon, 3rd edition, 2018.

SUGGESTED WEBSITES

1. https://onlinecourses.nptel.ac.in/
2. https://swayam.gov.in/

INSTRUCTIONAL STRATEGY

This is hands on practice based subject for development of required skills in the students. This workshop contains five units of equal weight age. Field visits must be included to museums, gardens and monuments for using various shapes, colours and textures in their designs.

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, Cyber security awareness.

COURSE OUTCOMES

At the end of the course student will be able to

CO1: Explain the basic components of Computers, Internet and issues of abuses/ attacks on information and computers.
CO2: Handle the Computer / Laptop / Mobiles / Internet Utilities and Install/Configure OS.
CO3: Assemble a PC and connect it to external devices.
CO4: Manage and Use Office practiced Automation Tools.
CO5: Develop 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

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 pdf To Word, Word To PPT, 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:

a. Addition of n numbers and display result
b. To convert temperature from Celsius to Fahrenheit
c. To find Area and Perimeter of Square
d. Swap Two Numbers
e. find the smallest of two numbers
f. Find whether given number is Even or Odd
g. To print first n even Numbers
h. find sum of series 1+2+3+…..+N
i. print multiplication Table of a number
j. generate first n Fibonacci terms 0,1,1,2,3,5…n (n>2)
k. sum and average of given series of numbers
l. Factorial of number n (n!=1x2x3x…n)
m. Armstrong Number
n. 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, “Comdex Hardware and Networking Course Kit” Dream Tech press, New Delhi, 2008
6. Sumitabha Das,“UNIX concepts and applications” Tata McGraw Hill, New Delhi, 4th Edition, 2008

SUGGESTED WEBSITES

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 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.

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	Textile Mathematics	3	-	3+0=3	40	-	40	60	-	60	100
3.3	Weaving Preparation	2	4	2+2=4	40	40	80	60	60	120	200
3.4	Basics of Garment Manufacturing Technology	3	4	3+2=5	40	40	80	60	60	120	200
3.5	Fabric Manufacture – I	3	4	3+2=5	40	40	80	60	60	120	200
3.6	Structural Fabric Design – II	3	4	3+2=5	40	40	80	60	60	120	200
# SCA		-	3	-	-	-	-	-	-	-	-
Total		**14**	**21**	**23**	**200**	**200**	**400**	**300**	**300**	**600**	**1000**

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	Dyeing Technology – I	3	4	**3+2=5**	40	40	80	60	60	120	200
4.3	Fabric Manufacture – II	3	4	**3+2=5**	40	40	80	60	60	120	200
4.4	Testing and Quality Control – I	2	4	**2+2=4**	40	40	80	60	60	120	200
4.5	Open Elective (MOOCs^{+}/Offline)	2	-	**2+0=2**	40	-	40	60	-	60	100
4.6	Minor Project	-	6	**0+3=3**	-	40	40	-	60	60	100
# Student Centered Activities (SCA)		-	3	**-**	-	-	-	-	-	-	-
Total		**12**	**23**	**22**	**200**	**200**	**400**	**300**	**300**	**600**	**1000**

* Common with other Diploma Courses.

\+ Assessment of Open 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.

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.	Textile Mathematics	3	-
3.	Weaving Preparation	6	-
4.	Basics of Garment Construction	7	-
5.	Fabric Manufacture – I	7	-
6.	Structural Fabric Design – II	7	-
7.	English and Communication Skills - II	-	4
8.	Dyeing Technology – I	-	7
9.	Fabric Manufacture – II	-	7
10.	Testing and Quality Control – I	-	6
11.	Open Elective (MOOCs/Offline)	-	2
12.	Minor Project	-	6
13.	Student Centered Activities	3	3
	Total	**35**	**35**

14. COMPETENCY PROFILE & EMPLOYMENT OPPORTUNITIES

Government and private sectors related to **Textile Design** require **skilled employees** to work in familiar, predictable, routine situations of clear choice. They are expected to have factual knowledge of textile design 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 Design NSQF Level – 4 pass out students are expected have good theoretical exposure of textile mathematics for its effective utilization in garment industries. They should have good theoretical and hands-on experience in weaving preparation, garment construction, fabric manufacture, and structural fabric design and should be able to apply it in textile industries. They are also expected to demonstrate skills in dyeing technology, testing and quality control. Students at this level are also expected to handle small projects related to garment industries.

Textile Design 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 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 field of textile design 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 open 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.	• Differentiate between various warping processes. • Handle the process of drawing-in, denting and beam gaiting. • Describe pirn winding and different types of yarn numbering systems. • Learn and practice cutting process. • Study and perform sewing processes. • Describe the components of trimmings. • Explain the components of pressing process. • Handle the inspection system and care labeling. • Describe about the mechanism of let-off and take-up motions. • Acquire knowledge and handle the working of various auxiliary motions of loom. • Describe tapestry and perform harness design calculations. • Draft a sketch design composing of jacquard design. • Learn and utilize reactive and azoic dyes in various applications. • Describe Vat and solubilized vat dyes and apply them in various applications. • Explain and use Sulphur and Acid dyes in various applications. • Describe the mechanism of jacquard shedding. • Practice manufacturing of card on card cutting machine • Differentiate various types of sampling techniques. • Perform the testing of length and maturity of fibers. • Describe and perform measurements of the twist.
PO2: Acquire factual knowledge in the	• Understand the use of logarithms.

field of textile design for employment	• Learn about area and perimeter of geometrical designs. • Acquire knowledge about the mean, median and mode. • Study permutations and combinations. • Explain the control charts and yarn diameter. • Study winding process. • Learn about sizing of yarn. • Describe pirn winding and different types of yarn numbering systems. • Learn and practice cutting process. • Study and perform sewing processes. • Describe the components of trimmings. • Explain the components of pressing process. • Study the objectives of loom. • Learn about the types of sheds and their limitations. • Explain picking, beat-up motions and loom timings. • Acquire knowledge and handle the working of various auxiliary motions of loom. • Study gauze and leno structures. • Learn weft pile fabrics. • Acquire knowledge about the warp pile fabrics. • Study about the different types of colourants and basic concepts of dyeing. • Learn and utilize reactive and azoic dyes in various applications. • Describe Vat and solubilized vat dyes and apply them in various applications. • Explain and use Sulphur and Acid dyes in various applications. • Acquire knowledge about the Natural dyes. • Study about multiple box motions. • Learn about the dobby shedding mechanism. • Acquire knowledge about the types of harness

	tyeing. • Learn about yarn numbering system. • Study the moisture and trash measurement methods.
PO3: Demonstrate routine and repetitive skills in narrow range of applications using appropriate rules and tools for quality.	• Differentiate between various warping processes. • Handle the process of drawing-in, denting and beam gaiting. • Describe pirn winding and different types of yarn numbering systems. • Learn and practice cutting process. • Study and perform sewing processes. • Describe the components of trimmings. • Explain the components of pressing process. • Handle the inspection system and care labeling. • Describe about the mechanism of let-off and take-up motions. • Acquire knowledge and handle the working of various auxiliary motions of loom. • Describe tapestry and perform harness design calculations. • Draft a sketch design composing of jacquard design. • Learn and utilize reactive and azoic dyes in various applications. • Describe Vat and solubilized vat dyes and apply them in various applications. • Explain and use Sulphur and Acid dyes in various applications. • Differentiate various types of sampling techniques. • Perform the testing of length and maturity of fibers. • Describe and perform measurements of the twist.
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 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.

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 TEXTILE MATHEMATICS

L	P
3	-

RATIONALE

Textile design students at this level are expected to have good knowledge of textile mathematics as this subject forms the backbone of textile design discipline. The subject will provide the base to textile design students to work in a textile mill confidently. These subject will also help textile design students to continue his education. This subject will also help the students to work in a textile testing lab or unit.

COURSE OUTCOMES

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

CO1: Understand the use of logarithms.

CO2: Learn about area and perimeter of geometrical designs.

CO3: Acquire knowledge about the mean, median and mode.

CO4: Study permutations and combinations.

CO5: Explain the control charts and yarn diameter.

DETAILED CONTENTS

UNIT I

Use of logarithms in calculations. Ratio properties, direct proportion and inverse proportion, percentage, averages

UNIT II

Area and perimeter of rectangle, parallelogram, triangle, trapezoid, regular polygon, circle, sector volume and surface areas of cylinder and cylinder with a central hole.

UNIT III

Definition and simple calculations of arithmetic mean, median, mode (individual and direct series). Simple calculations based on standard deviation and coefficient of variation.

UNIT IV

Permutation and combination, value of ${}^{n}P_{r}$ and ${}^{n}C_{r}$, its properties and simple problems

UNIT V

Control charts and their use (short term, medium term and long term variations and random variations). Calculation of yarn diameter and fabric cover factor.

RECOMMENDED BOOKS

1. Statistical Mathematics by S P Gupta,2012
2. Applied Mathematics, Vol. I & II by S SSabharwal and others; Eagle Prakashan, 1989
3. Engineering Mathematics, Vol. I; Ishan Publishing House,2015
4. Textile Mathematics, Vol. I by J E Booth, The Textile Institute, 1975
5. Weaving Calculation, R sen Gupta , 1959

RECOMMENDED WEBSITES

1. https://onlinecourses.nptel.ac.in/
2. https://swayam.gov.in/

INSTRUCTIONAL STRATEGY

This is theoretical subject for basic fundamental knowledge and contains five units of equal weight age.

3.3 WEAVING PREPARATION

L	P
2	4

RATIONALE

Textile design students must have the knowledge of preparatory processes like winding, warping, sizing, drawing-in, weft winding/pirn winding for proper weaving. This subject will help the students to learn the different preparatory processes before weaving. It will further help the students to understand different yarn numbering systems and their conversion from one system to another.

COURSE OUTCOMES

After undergoing this subject, the students will be able to:
CO1: Study winding process.
CO2: Differentiate between various warping processes.
CO3: Learn about sizing of yarn.
CO4: Handle the process of drawing-in, denting and beam gaiting.
CO5: Describe pirn winding and different types of yarn numbering systems.

DETAILED CONTENTS

UNIT I

Winding- warp winding, objective of winding, yarn faults, yarn packages, package faults and their remedies, objectives of yarn clearers and yarn tensioners. Introduction to Auto-coner and its salient features.

UNIT II

Warping- Objectives of warping, types of warping – beam warping, sectional warping. Difference between direct warping and indirect warping. Types of creels.

UNIT III

Sizing- Objectives of sizing and passage of warp sheet through slasher sizing machine. Size recipe and ingredients for 100% cotton.

UNIT IV

Introduction to Drawing-in, denting and beam gaiting.

UNIT V

Weft Winding/pirn winding- objectives of weft winding, passage of yarn through a pirn winding machine. Yarn numbering system and their conversion from one system to another.

PRACTICAL EXERCISES

1. To find English count of a given yarn and its conversion into Tex and Denier.
2. To inspect a given cone/package and to detect different faults and their causes and remedies.
3. To find metric count of a given yarn.
4. To find denier and tex of a given yarn.
5. To study passage of material through a drum winding machine.
6. Demonstration of beam warping machine and preparation of warp beam
7. Demonstration of sectional warping
8. Preparation of pirn on pirn winding machine
9. Practice of drafting.
10. Practice of denting.
11. Practice of beam gaiting.
12. To study working of an auto-coner and to draw passage of yarn through it.

RECOMMENDED BOOKS

1. Weaving Mechanism Vol. I and II by NN Banerjee, Textile Book House, 1986
2. Winding and Warping by BTRA, 1983
3. Warp Sizing by JB Smith, PublisherFeng Chia, 1969
4. Principle of Weaving by R.Marks F.T.I and A.T.C Robinsons. By The Textile Institute Manchester 1976
5. Yarn Preparation Vol. I and II by R Sen Gupta, Popular Prakashan, 1963

RECOMMENDED WEBSITES

1. http://swayam.gov.in

2. https://onlinecourses.nptel.ac.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.

3.4 BASIC OF GARMENT MANUFACTURING TECHNOLOGY

L	P
3	4

RATIONALE

Textile design students at this level should have knowledge and skills in cutting of fabric. They should know about the sewing using different sewing machines. They should be aware of different basic problems related to sewing machines. They are expected to have knowledge about the components of trimmings pressing etc. to appreciate design components in textile.

COURSE OUTCOMES

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

CO1: Learn and practice cutting process.
CO2: Study and perform sewing processes.
CO3: Describe the components of trimmings.
CO4: Explain the components of pressing process.
CO5: Handle the inspection system and care labeling.

DETAILED CONTENTS

UNIT I

Cutting: The planning, drawing, pattern making and reproduction of the marker, Objective of spreading, various ways of spreading, cutting of the fabric and methods of cutting with cutting tools viz. straight knife, band knife and computer control cutting knives.

UNIT II

Sewing: Basic sewing machine and its working mechanism of different parts, properties of seams, seam types, seam finishes, sewing machine needles types, sewing machine defects and remedies.

UNIT III

The use of components and triminings, Lables and motifs, linings, interlinking, waddings and zip fasteners.

Pressing: The principle of pressing, pressing equipment and methods.

UNIT IV

Inspection systems and care labeling of apparel and textiles/Ecolabels American care labeling (CLS), International care labeling system, British care labeling systems, Japanese care labeling system.

UNIT V

Definition of fashion, style and design, mass fashion, high fashion, classic, fad, fashion leaders, fashion followers. Objectives of various departments in a garment house viz fabric sourcing, quality, merchandising, role of a merchandiser, production planning and control.

PRACTICAL EXERCISES

1. To study tools and equipments used in clothing/garment constructions.
2. To demonstrate the sewing machine, functions and working of various parts.
3. To demonstrate various sewing aids used in garment design lab.
4. To make simple stitches on cloth like circular, straight lines etc.
5. To make different types of pleats and gather.
6. To study and prepare different necklines.
7. Appliances required for pressing and finishing and pressing of textiles and finishes (mill visits only).
8. To develop samples of different seam types on a sewing machine.
9. To study basic hand stitches on a fabric.
10. To study about sewing machine needles used in garment manufacturing.
11. To develop fabric samples by using different types of stitches.
12. To list various sewing problems on basic sewing machine.
13. To prepare samples of pocket.

RECOMMENDED BOOKS

1. Garment Finishing and Care Labelling by SS Satsangi, M/s Usha Publications, Delhi, 2002.
2. Textiles-Fibres and Fabrics by Bernard Polytechnic Corbman, M/s McGraw Hill, International Edition, 1988.
3. Garment Design by Armstrong, Fairchild Publications, 2005.

4. The Technology of clothing manufacture by Harold carr& Barbara Latham, 1988.
5. Fashion Production Terms, Debbie Ann Gioello; Beverly Berke, Language of Fashion Hardcover, 1981.

SUGGESTED WEBSITES

1. https://onlinecourses.nptel.ac.in/
2. https://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 FABRIC MANUFACTURE - I

L	P
3	4

RATIONALE

Textile design students after this level are expected to have knowledge of different motions of a loom, types of looms and manufacturing of fabric on these looms. They should also have knowledge loom timings. This subject will help the students to have knowledge of various stop motions working on a loom. It will further give exposure to the students about the fabric manufacturing techniques and different mechanisms used to produce a fault free woven fabric.

COURSE OUTCOMES

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

CO1: Study the objectives of loom.

CO2: Learn about the types of sheds and their limitations.

CO3: Explain picking, beat-up motions and loom timings.

CO4: Describe about the mechanism of let-off and take-up motions.

CO5: Acquire knowledge and handle the working of various auxiliary motions of loom.

DETAILED CONTENTS

UNIT I

Introduction, objectives and classification of looms. Passage of material through a conventional non- automatic loom. Study of different parts of a loom. Various motions of a loom: primary, secondary and auxiliary motions.

UNIT II

Tappet shedding: negative tappet shedding, positive tappet shedding, early and late shedding, heald reversing motion: roller reversing motions, spring reversing motion. Types of sheds, their merits and demerits. Limitations of a tappet shedding.

UNIT III

Picking motions: overpick, side lever underpick mechanism. Early and late picking. Causes of shuttle flying out, shuttle trapping and their remedies, Beat up mechanism (crank beat up). Temples and their types. Loom timing.

UNIT IV

Let off mechanism – objectives of positive and negative let off motions and their working. Take up motion: intermittent and continuous take up motions. 5- wheel and 7- wheel take up motion.

UNIT V

Warp stop motions: electrical and mechanical warp stop motions. Warp protecting motions, objectives, loose reed and fast reed warp protecting motions. Weft stop motions, objectives, working principle of side weft fork motion and centre weft fork motion.

PRACTICAL EXERCISES

1. To study the passage of yarn through a non automatic conventional loom.
2. To understand the working of tappet shedding motion.
3. Dismantling and assembling of heald reversing motion.
4. To dismantle and assemble overpick motion.
5. To dismantle and assemble underpick motion
6. To study the working of beat up motion.
7. Dismantling and resetting of negative let off motion.
8. Dismantling and resetting of 5- wheel take up motion.
9. To study the working of 7 – wheel take up motion by dismantling and assembling.
10. Practically setting-up the mechanical warp stop motion as per loom timings.
11. To understand the principle and working of loose reed warp protecting motion
12. To study the principle and working of fast reed warp protecting motion.
13. To understand the principle and working of side weft fork motion.
14. To calculate the speed, production and efficiency of a loom.

RECOMMENDED BOOKS

1. Weaving Mechanism Vol.I, by NN Benerjee, Textile Book House,1986.

2. Mechanism of weaving TW Fox, Macmillanand Co.,1894
3. Principles of weaving by Marks and Robinsons,The Textile Institute,1976
4. Weaving – Machines, Mechanics, Management by Talukdar,Mahajan Publisher Pvt.Ltd.,1998
5. Textile Spinning Weaving And Designing, M G Mahadevan, Abhishek Publications, Chandigarh,1996
6. Hand book of fabric manufacturing,B. purushothama,Wood head Publishing India in Textile,1987
7. Woven textiles,KM Gandhi,Wood head Publishing India in Textile,1992
8. Weaving I, Shuttle looms, Prof. P.A. Khatwani, Prof A K Gupta,NCUTE, Deptt. of Textile Technology, IIT Delhi, Sept 2-4, 1999

RECOMMENDED WEBSITES:

1. https://onlinecourses.nptel.ac.in/
2. https://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 STRUCTURAL FABRIC DESIGN - II

L	P
3	4

RATIONALE

Textile design students are supposed to have knowledge regarding various advanced weaves and their construction on graph paper and their warp and weft cross sectional views. They are also expected to have knowledge of pile fabrics construction process and their designs. This subject will help the students to have knowledge of different weaves, their method of employment to acquire competency for production of woven designs for different end uses.

COURSE OUTCOMES

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

CO1: Study gauze and leno structures.
CO2: Learn weft pile fabrics.
CO3: Acquire knowledge about the warp pile fabrics.
CO4: Describe tapestry and perform harness design calculations.
CO5: Draft a sketch design composing of jacquard design.

DETAILED CONTENTS

UNIT I

Gauze and Leno Structures- Principle of leno structure, bottom and top douping, basic sheds of leno weaving. Comparison of gauze with leno. Russian cord. Damasks and brocades - A simple design.

UNIT II

Weft pile Fabrics- construction of velveteen, weft plushes and corded velveteen. Terry pile structures – principle of formation of three pick and four pick terry fabrics.Ornamentation of terry fabrics.

UNIT III

Warp pile fabrics produced with the aid of wires-valvet, alternate pile ends over alternate wires. Formation of warp pile fabrics on face to face principle.

UNIT IV

Tapestry – introduction and definition only. Harness and design calculations – sett of harness, casting-out in jacquards.

UNIT V

Construction of squared paper designs, process of drafting a sketch design, design from woven fabrics, development of figures. Methods of composing jacquard designs, conditions to observe in designing figured fabrics.

PRACTICAL EXERCISES

1. To study objects and methods of analyzing fabric
2. To study the particulars to be analyzed of a woven fabric.
3. To identify warp and weft in a given fabric.
4. Analysis of gents Shirting (Cotton) fabric.
5. Analysis of stripes fabrics.
6. Analysis of small geometrical motifs fabric.
7. Analysis of gents suiting fabric.
8. Analysis of gauze and leno fabric.
9. Analysis of trouser having a design.
10. Analysis of Tweed material for jackets in wool
11. Analysis of ladies dress material.
12. Analysis of weft pile fabrics.
13. Analysis of warp pile fabrics.
14. Making of damask design on graph paper.
15. Making of brocade design on graph paper.

RECOMMENDED BOOKS

1. Grammer of Textile Design – Nisbet, Wentworth Press, 1906
2. Fabric Structure and Design, N Gokarneshan, New age International, 2004
3. Watson’s Advance Textile Design, Z J Grosicki, Woodhead Publication, 1913
4. Watson’s Textile Design and Colour, Z J Grosicki, Woodhead Publication, 1912
5. Woven Structures and Design – Doris Goerner; British Textile Technology Group WIRA House, Leeds (UK), 1988

6. Textile Spinning Weaving And Designing, M G Mahadevan, Abhishek Publications, Chandigarh, 1992
7. Textile Design and Structure, Chitrachowdhary, Meena Gupta, Crescent Publishing House, 1993

SUGGESTED WEBSITES

1. https://onlinecourses.nptel.ac.in/
2. https://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.

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 DYEING TECHNOLOGY - I

L	P
3	4

RATIONALE

Textile design students at this level should have sufficient knowledge and skills about principles of dyeing, operations, materials, equipment and processes. They should be able to execute various recipes for dyeing. This subject will help the students to control various processing parameters on machinery at the process house while dyeing different materials like cotton, wool and silk.

COURSE OUTCOMES

After undergoing the subject, the students will be able to:
CO 1: Study about the different types of colourants and basic concepts of dyeing.
CO 2: Learn and utilize reactive and azoic dyes in various applications.
CO 3: Describe Vat and solubilized vat dyes and apply them in various applications.
CO 4: Explain and use Sulphur and Acid dyes in various applications.
CO 5: Acquire knowledge about the Natural dyes.

DETAILED CONTENTS

UNIT I

Introduction to textile dyes- Classification of dyestuff on the basis of methods of application, general terminology used in dye house.

Properties of Direct dye, application method for Direct dyes on cellulosic materials and application methods to improve fastness.

UNIT II

Reactive Dye- Types of Reactive dyes and their properties, concept of exhaustion, fixation and hydrolysis in reactive dyes, application methods on cotton with chlorotriazine and vinyl sulphones and processes such as Pad batch, continuous and exhaust dyeing and after-treatments.

Azoic colour – Principle of dyeing and application to cotton.

UNIT III

Vat Dyes- Introduction, Properties, classification of Vat dyes, concept of Vat dyes- solubilisation, development and oxidation, application to cotton yarns and fabric by different processes.

Solubilized Vat dyes- Properties and application to cotton material.

UNIT IV

Sulphur Dyes- Properties and application to cotton, reduction and oxidation, bronziness of shades and Sulphur black tendering.

Acid Dyes – Classification, properties, mechanism and method of application on wool and silk. Metal complex dyes and their applications.

UNIT V

Introduction to natural dyes and its importance, their sources, their application on different textiles fibers.

Various fabric dyeing machines such as padding mangle, winch and jigger.

PRACTICAL EXERCISES

1. To dye cotton with direct dye.
2. To study different after treatments on Direct dyed fabric.
3. To dye cotton with Reactive dyes (Cold brand).
4. To dye cotton with Reactive dyes (Hot brand).
5. To dye cotton with Sulphur dyes.
6. To dye cotton with Vat dyes.
7. To dye cotton with Azoiccolours.
8. To dye wool fibre with acid dyes.
9. To dye silk with acid dyes.
10. To dye cotton with Solublized vat dyes.
11. To dye the wools with metal complex dyes.
12. To dye the cotton with any suitable natural dye.
13. To dye the wool/silk with any suitable natural dye.

RECOMMENDED BOOKS

1. Technology of Dyeing by V.A Shenai; Sevak Publication, Mumbai.
2. Dyeing and Chemical Technology of Textile Fibres by E.R Trotman; B.I Publication, New Delhi.
3. Printing and Dyeing of Fabric by James.
4. Chemistry and Principles of Dyeing by V.A Shenai; Sevak Publication, Mumbai.
5. Dyeing of Wool and Silk by R.S Paryag.
6. The Dyeing of Woolen fabrics by F. Beech; Abhishek Publication, Chandigarh.
7. Silk Dyeing, Printing and Finishing by Hurst; Abhishek Publication, Chandigarh.
8. Dyeing and Silk by Dr. V. A. Shenai; Sevak Publication, Mumbai.
9. The dyeing of cellulose fibres by Clifford Pireston
10. Textile processing and properties by T. L. Vigo

SUGGESTED WEBSITES

1. https://onlinecourses.nptel.ac.in/
2. https://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 FABRIC MANUFACTURE - II

L	P
3	4

RATIONALE

Textile design students are supposed to have knowledge and skills related to various looms and manufacturing of fabric. This subject will help the students to learn manufacturing techniques and mechanism employed to produce medium design fabrics using Dobby along with large and elaborate design fabrics using Jacquard. This subject will further give exposure about preparation of card for a given Jacquard design. Students will be able to prepare chain for box motion.

COURSE OUTCOMES

After undergoing the subject, the students will be able to:
CO1: Study about multiple box motions.
CO2: Learn about the dobby shedding mechanism.
CO3: Describe the mechanism of jacquard shedding.
CO4: Acquire knowledge about the types of harness tyeing.
CO5: Practice manufacturing of card on card cutting machine

DETAILED CONTENTS

UNIT I

Introduction to multiple box motion, its objects, classification of multiple box motion, mechanism and working principle of Cow burn/Eccles's box motion.

UNIT II

Chain making for 4x4 drop box motion. Definition of pick-at-will motion, pick-and- pick loom. Dobby Shedding- Single lift, double lift dobby, construction and working of Climax dobby and Paper dobby shedding devices. Construction and working of electronic dobby.

UNIT III

Jacquard shedding - Introduction to jacquard shedding mechanism, its objects and classification of jacquard. Principle and working of Single lift single cylinder jacquard, Double lift single cylinder jacquard, Double lift double cylinder jacquard.

UNIT IV

Introduction to Inverted hook jacquard shedding mechanism, its objectives and working principle. Principle and working of Cross-border jacquard and Leno jacquard. Introduction to Electronic jacquard mechanism.

UNIT V

Principle of harness building, classification of harness ties, Straight harness tie and pointed harness tie methods. Principle and working of Piano card cutting machine.

PRACTICAL EXERCISES

1. To study the principle and working of 4x1 drop box motion.
2. To prepare a pattern chain for a particular weft pattern for the Eccle's drop box motion.
3. To study the principle and working automatic pirn change mechanism along with weft feelers.
4. To study the principle and working of the single lift dobby.
5. To study the principle and working of the double lift dobby (climax dobby)
6. To study the principle and working of the single lift single cylinder jacquard.
7. To study the principle and working of the double lift single cylinder jacquard.
8. To study the principle and working of the double lift single cylinder jacquard.
9. To study the principle and working of the double lift double cylinder jacquard
10. To study the principle and working of the inverted hook jacquard.
11. To study the harness building for a particular repeat size on jacquard.
12. To study the card cutting for a particular design for jacquard.

RECOMMENDED BOOKS

1. Weaving mechanism Vol.I and Vol.II by N NBenerjee
2. Fancy weaving by KT Aswani
3. Principles of weaving by marks and Robinsons.
4. Mechanism of weaving by TW Fox.
5. Jacquard-EK Saral Vidya by S.S. Satsangi (Bilingual)

SUGGESTED WEBSITES

1. https://onlinecourses.nptel.ac.in/
2. https://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. Student may be asked to do all the work on handloom or power loom machines to develop the knowledge and skill in fabric manufacturing. This subject contains five units of equal weight age.

4.4 TESTING AND QUALITY CONTROL - I

L	P
2	4

RATIONALE

Textile design students at this level are responsible for testing and quality control of fiber and yarn at the shop floor. They will be able to work on various types of fiber and yarn testing equipments as well as their maintenance. Thus in this subject, students will be made fully aware of different quality standards and their maintenance during manufacturing processes for the total quality concept.

COURSE OUTCOMES

After undergoing the subject, the students will be able to:
CO1: Differentiate various types of sampling techniques.
CO2: Learn about yarn numbering system.
CO3: Study the moisture and trash measurement methods.
CO4: Perform the testing of length and maturity of fibers.
CO5: Describe and perform measurements of the twist.

DETAILED CONTENTS

UNIT I

Textile testing - It's Aim and scope. Concept of quality control and its importance. Importance of fixing standards. Need of sampling. Sampling techniques. Random and biased samples.

UNIT II

Methods of yarn numbering, direct, indirect and universal systems, simple numerical problems based on yarn numbering system and conversion from one system to another. Calculation of resultant count.

UNIT III

Importance of Moisture relation and its influence on fibre properties. Definition of humidity, Absolute humidity, Relative humidity, Moisture content and Moisture regain. Trash content in cotton fibre and its measurement with the help of Shirley trash analyzer.

UNIT IV

Fibre maturity and its importance, measurement with the help of Caustic soda swelling method. Measurement of fibre length with the help of Baer sorter and its analysis. Importance of fibre fineness and its measurement with the help of Airflow method (Sheffield Micronaire).

UNIT V

Yarn twist and its measurement, direction of twists. Function of twist in yarn structure. Effect of twist on yarn Properties. Use of twist multiplier. Measurement of twist in single and ply yarns (straighten fibre method, twist de twist method). A brief introduction to yarn evenness.

PRACTICAL EXERCISES

1. To prepare a random sample of raw cotton fibers by using Zoning technique.
2. To determine English count of a given yarn with the help of wrap reel.
3. To determine the hank of given sliver and roving with the help of wrap block.
4. To Measure the Relative humidity with the help of wet and dry bulb hygrometer.
5. To measure Moisture content and Moisture regain of cotton fibre with the help of conditioning oven.
6. Determination of fibre maturity with the help of Caustic soda method.
7. Determination of staple length, effective length, mean length and short fibre percentage with the help of Baer sorter
8. To measure Moisture content and Moisture regain of cotton fibre with the help of Shirley moisture meter.

8. To measure yarn twist with the help of twist contraction method.
9. To measure yarn twist with the help of twist tester.
10. To find out the diameter of the given yarn with the help of Projection microscope.
11. To determine yarn count of a given fabric with the help of Beesley balance.
12. To determine yarn count with the help of quadrant balance.

RECOMMENDED BOOKS

1. Textile Testing by JE Booth
2. Textile Testing by Grover and Hamley
3. Textile Testing by John H.Skinkle; DB Taraporewala and Sons, Bombay

SUGGESTED WEBSITES

1. https://onlinecourses.nptel.ac.in/
2. https://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. Student must be taken to textile industries/Mills for practice and study of inspection and quality control operations so that the students are aware of the industry practices. This subject contains five units of equal weightage.

4.5 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, KhanAcademy 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/

4.6 MINOR PROJECT

L	P
-	6

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	Printing Technology	2	4	2+2=4	40	40	80	60	60	120	200
5.3	Fabric Manufacture – III	3	4	3+2=5	40	40	80	60	60	120	200
5.4	Dyeing Technology – II	2	4	2+2=4	40	40	80	60	60	120	200
5.5	Testing and Quality Control- II	2	4	2+2=4	40	40	80	60	60	120	200
5.6	Computer Aided Textile Design - I	-	6	0+3=3	-	40	40	-	60	60	100
5.7	Multidisciplinary Elective (MOOCS^{+}/offline)	2	-	2+0=2	40	-	40	60	-	60	100
Total		**11**	**24**	**23**	**200**	**240**	**440**	**300**	**360**	**660**	**1100**

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

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	*Humanities & Life Skills	3	-	3+0=3	40	-	40	60	-	60	100
6.2	*Entrepreneurship Development & Management	3	-	3+0=3	40	-	40	60	-	60	100
6.3	Program Elective - I	3	-	3+0=3	40	-	40	60	-	60	100
6.4	Program Elective - II	3	-	3+0=3	40	-	40	60	-	60	100
6.5	Computer Aided Textile Design - II	-	6	0+3=3	-	40	40	-	60	60	100
6.6	Major Project/ Industrial Training	-	16	0+8=8	-	40	40	-	60	60	100
# Student Centered Activities (SCA)			1	-	-	-	-	-	-	-	-
Total		**12**	**23**	**23**	**160**	**80**	**240**	**240**	**120**	**360**	**600**

Program Electives -I: 6.3.1. Knitted Design **6. 3.2.** Non-Woven Technology **6.3.3.** Technical Textiles

Program Electives -II: 6.4.1. Garment Processing **6.4.2.** Merchandising and Export Management **6.4.3.** Process House Management

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.

19. HORIZONTAL AND VERTICAL SUBJECTS ORGANISATION

Sr. No.	Subjects/Areas	Hours Per Week	
		Fifth Semester	Sixth Semester
1.	Industrial Training - II	2	-
2.	Printing Technology	6	-
3.	Fabric Manufacture – III	7	-
4.	Dyeing Technology – II	6	-
5.	Testing and Quality Control- II	6	-
6.	Computer Aided Textile Design - I	6	-
7.	Multidisciplinary Elective (MOOCs/Offline)	2	-
8.	Humanities & Life Skills	-	3
9.	Entrepreneurship Development & Management	-	3
10.	Programme Elective - I	-	3
11.	Programme Elective - II	-	3
12.	Computer Aided Textile Design - II	-	6
13.	Major Project / Industrial training	-	16
14.	Student Centered Activities	-	1
	Total	**35**	**35**

20. COMPETENCY PROFILE & EMPLOYMENT OPPORTUNITIES

Government and private sectors related to **Textile Design** require **supervisors** having well developed skills with clear choice of procedures. They are expected to have complete knowledge and practical skills related to textile design 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 Design 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 printing technology fabric manufacture, dyeing technology, testing and quality control for working efficiently in textile design industries. They are also expected to have good practical knowledge and exposure of computer aided textile design.

Textile design 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 design.

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 multidisciplinary electives 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.	• Describe the working of different machine and equipment used for making different prints • Define the printing of different materials and after-treatment processes • Define various types of weft insertion mechanisms in rapier looms • Describe about the mechanism of Airjet weaving machine. • Describe disperse dyes on polyester with different methods and Nylon Dyeing • Use various applications in Dyeing blends with various dyes. • Define various Textile machineries used in a process house • Describe about fabric stiffness, handle and drape, crease recovery, pilling and their measurement. • Define the concepts of serviceability, abrasion and its measurement and fabric defects. • Handle CorelDraw designing tools. • Create the designs with the help of relevant software. • Use various tools of adobe Photoshop to create textile design. • Perform the formation of designs using different tools. • Visualize various applications of CAD in textile designing. • Use different kind decorative and innovative of designs • Present different weave structure with styling. • Develop the skills to use Ned graphic for

	jacquard designing. • Create the dobby designs with the help of CAD Ned graphic software. • Perform modification of weaves, checks designs using software.
PO2: Acquire knowledge of facts, principles and processes related to textile design.	• Acquire knowledge about printing and its different method and styles and printing ingredients • Learn about various styles and methods of printing • Explore about various novel techniques of printing • Study the unconventional weaving machines • Learn about the working principle of projectile looms. • Acquire knowledge about the working of water jet looms. • Learn about acid mordant and basic dyes in various applications • Acquire knowledge about Fastness Tests and eco-friendly dyeing processes. • Learn the importance of single yarn strength, lea strength and their measurement. • Study fabric thickness, yarn crimp, fabric weight, cover factor and their measurement. • Acquire knowledge about different fabric strengths and their measurement. • Understand about different types of knitting and difference between knitting and weaving. • Acquire knowledge of various functions of the Knitting technologies. • Explain different weft knit structures, their characteristics and different mechanisms of flat bed and circular weft knitting machines. • Learn the different problem & understand the

	quality aspects for the knitting. • Study the warp knitting machines for knitting industries • Understand the importance of the nonwoven fabrics. • Learn the problems occurred during manufacturing of nonwovens. • Explain the different structure of nonwovens. • Study the physical and mechanical behavior of nonwovens. • Acquire knowledge about the principle & manufacturing process of hydro entangled nonwoven fabrics. • Acquire brief knowledge of technical fibers, composite materials and their uses. • Learn about medical and protective textiles. • Study various Functional requirement of sports and automobile textiles. • Understand about Geogrid, Geomembrane and Geocomposite and their properties. • Explore About functional requirements and types of textiles used for agricultural, electronics and power transmission. • Learn about various fabric materials used in garment manufacturing industries. • Acquire knowledge about stain removal procedures for various applications. • Study different denim dyeing techniques and advancements. • Explore different concepts of finishing denim fabrics. • Understand the washing procedure of denim garments. • Understand the scope, nature, importance and functions of merchandising

	• Study planning and control tools, executing planning action plan and preparation of PPM file. • Learn about costing and pricing formula and strategies, fabric consumption calculation and development of costing sheet. • Acquire knowledge about selection and management of vendor for sourcing and various import / export documentation. • Explore the sourcing process and role of merchandiser in sourcing process • Understand the basic concepts of plant layout their types and affecting factors. • Study different types of production, process planning and record keeping. • Learn different types of maintenance-procedures and material handling. • Acquire knowledge about the cost estimation and effluent treatment. • Explore basic methods of minimizing water & steam consumption.
PO3: Demonstrate cognitive and practical skills to complete tasks and solve problems.	• Describe the working of different machine and equipment used for making different prints • Define the printing of different materials and after-treatment processes • Define various types of weft insertion mechanisms in rapier looms • Describe about the mechanism of Airjet weaving machines • Describe disperse dyes on polyester with different methods and Nylon Dyeing • Use various applications in Dyeing blends with various dyes. • Define various Textile machineries used in a process house • Describe about fabric stiffness, handle and drape,

	crease recovery, pilling and their measurement. • Define the concepts of serviceability, abrasion and its measurement and fabric defects. • Handle CorelDraw designing tools. • Create the designs with the help of relevant software. • Use various tools of adobe Photoshop to create textile design. • Perform the formation of designs using different tools. • Visualize various applications of CAD in textile designing. • Use different kind decorative and innovative of designs • Present different weave structure with styling. • Develop the skills to use Ned graphic for jacquard designing. • Create the dobby designs with the help of CAD Ned graphic software. • Perform modification of weaves, checks designs using software.
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. • Discover personal competence and techniques of building emotional intelligence. • Demonstrate a set of non-cognitive skills such as empathy, teamwork, collaboration, interpersonal

	skills, and resilience for smooth and efficient functioning at the workplace • Demonstrate the dynamics of individual, interpersonal and group processes that influence behaviour within teams and organizations. • Reflect ethical behaviour with a sense of right and wrong leading to practical ethical behaviour. • Demonstrate leadership qualities with balance of emotional and social quotient. • 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 online multidisciplinary electives of own interest to promote self-learning.	• Apply critical thinking in problem solving. • Demonstrate self and time management. • Display analytical and research abilities. • Integrate multiple knowledge domains. • Enhance the scope and depth of learning.

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 environmentof relevant industries. The student will learn to work in team to solve the industrial problems. It willalso 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 PRINTING TECHNOLOGY

L	P
2	4

RATIONALE

Textile design diploma students are expected to have sufficient knowledge and skills about principles of dyeing, operations, materials, equipment and processes. They should be able to formulate recipes for dyeing of different types of material. This subject will help in development of required skills in textile printing.

COURSE OUTCOMES

After undergoing the subject, the students will be able to:
CO1: Acquire knowledge about printing and its different method and styles and printing ingredients
CO2: Learn about various styles and methods of printing
CO3: Describe the working of different machine and equipment used for making different prints
CO4: Define the printing of different materials and after-treatment processes
CO5: Explore about various novel techniques of printing.

DETAILED CONTENTS

UNIT I

Introduction to Textile Printing: Objectives, brief historical background, Difference between- Dyeing and printing
Introduction to Methods and styles of printing.
Printing Paste: Various ingredients used and their purpose. Different thickeners used for printing. Essential qualities of a thickener used in printing of textiles.

UNIT II

Direct Style: Study of Printing by direct style with Direct, Reactive and pigment dyes.
Discharge style - Principles of Discharging, White and coloured discharge printing on Direct, Reactive, Vat dyes

Resist style- Resist Style of Printing on Cotton, Principles of Resisting, White and coloured Resist Printing.
Block Printing Method: Equipment used and steps of block printing, types of Blocks -wooden blocks, metal blocks, pin blocks. Advantages and limitations of block printing.
Breif introduction about Stencils and Screen Printing (Manual) and its advantages.
Flat Bed printing machine: principle and working of machine

UNIT III

Roller Printing: Study of working of various parts of roller printing machines, Methods of engraving of copper roller: Mill Engraving, Pantograph Engraving.
Defects and their remedies, advantages & disadvantages of Roller Printing machine
Rotary Screen Printing machines: Introduction, working, advantages & limitations of rotary screen printing

UNIT IV

Brief introduction about printing of woolen, silk, polyamide and polyester materials.
Fixation and After Treatments of Printing: Objectives of ageing, steaming, curing, washing, soaping.
Construction and working of rapid ager, high pressure steamer, continuous steamer.

UNIT V

Brief introduction of transfer printing; Melt transfer, Film release transfer, Swet transfer. Features of paper, ink and dyes for transfer printing
Special Styles of Printing
Dyed style–Tie and Dye or Bandhani Print, Batik style of Printing, Burn out style.
Brief Introduction of inkjet and digital printing

PRACTICAL EXERCISES

1. To prepare a thickening paste of sodium alginate or starch, and study the effect of acid and alkali on it.
2. To print fabric sample on cotton using film stencils on the theme of flowers and leafs.
3. To print fabric sample on cotton using film stencils on the theme of geometric pattern
4. To Print cotton fabric sample by Block Printing with suitable dyes.
5. To print cotton fabric sample using direct dyes by direct style using screen.
6. To print cotton fabric sample by cold brand reactive dyes by direct style

7. To print cotton fabric sample by white discharge style of printing
8. To print cotton fabric sample by Tie and Dye styles
9. To print cotton fabric sample by batik style
10. To make a line diagram of the curing chamber and study its working (may be done by mill visit.)
11. To print protein textile material with suitable dyes.
12. To print polyster/nylon textile material with suitable dyes.

RECOMMENDED BOOKS

1. Dr. V.A. Shanai, “Technology of Printing”, Sewak Publications, Mumbai, Edition.
2. I.W.C. Miles, “Textile Printing”, Society of Dyers & Colourists.
3. Joyci Storey, “Textile Printing”, Thames & Hudson Ltd., London, Edition.
4. Pam Stall Ebrans, “The Creative Guide to Fabric Screen Printing”, New Holland Publishers Ltd., 37, Connaught street, London.
5. D.G. Kale, “Principles of cotton printing”, Publication Committee for Prof. D.G. Kale's Book on Cotton Printing AITRA.
6. Knecht, E and Fothergill, “The Principles and Practice of Textile Printing”, London, C. Griffin & Company, Limited.
7. “Printed Textile Students Handbook + Practical Manual”, The Secretary, Central Board of Secondary Education, Shiksha Kendra, 2, Community Centre, Preet Vihar, Delhi.
8. Textile Printing Book of papers by Prof. R.B. Chavan
9. An Introduction to Textile Printing by W. Clarke

RECOMMENDED WEBSITES

1. https://textilestudycenter.com/textile-printing/
2. https://www.cibitex.it/pre-treatment-drying-fixation-digitally-printed-fabrics/
3. http://imprimerie-sanjose.com/what-are-the-different-types-of-printing/
4. http://swayam.gov.in

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 FABRIC MANUFACTURE – III

L	P
3	4

RATIONALE

The students of textile design are supposed to have knowledge and skill regarding various advanced weaving machines and their principle of working. Students will learn about the advantages of modern picking mechanism and types of weft insertion system. This subject will help the students to acquire knowledge of various parts of modern looms and unconventional weaving systems for various fabrics.

COURSE OUTCOMES

After undergoing the subject, the students will be able to:
CO1: Study the unconventional weaving machines
CO2: Learn about the working principle of projectile looms.
CO3: Define various types of weft insertion mechanisms in rapier looms
CO4: Describe about the mechanism of Airjet weaving machines
CO5: Acquire knowledge about the working of water jet looms.

DETAILED CONTENTS

UNIT 1

Introduction to unconventional weaving machines. Advantages against shuttle picking mechanism. Type of unconventional picking, Advantages of modern picking mechanisms, Comparison with shuttle picking. Types of selvedges – conventional, tucked, cross leno. Principle and working of Weft accumulator

UNIT 2

Basic principle of projectile loom, Sequence of weft insertion by Projectile/Gripper, Tuck-in selvedge formation, return of gripper. Features and advantages of projectile weaving

UNIT 3

Weft Insertion by Rapier (Main Features) Classification of rapiers- single and double phase rapiers. Introduction of Gabler and Dewas system of weft insertion. Advantages of rapier loom

UNIT 4

Weft Insertion by Airjet, Introduction and working principle of airjet loom, Advantages and disadvantages. Problems in airjet loom.

UNIT 5

Weft insertion by Water jet, Introduction and working principle of water jet loom, Advantages and disadvantages. Problems in water jet loom.

PRACTICAL EXERCISES

1. To study the passage of yarn through an unconventional weaving machine.
2. To understand the types of selvedge and their importance in modern looms.
3. Dismantling and assembling of weft accumlator in modern looms.
4. To study the principle and working mechanism of projectile loom.
5. To understand the principle and working of flexible and rigid rapier looms.
6. To understand the working of Gabler and Dewas system of weft insertion.
7. To study the features and advantage of Airjet loom.
8. To understand the function and importance of profiled Reed and confusors.
9. To understand the principle and working of water jet loom.
10. Dismantling and assembling of Reed on a water jet loom.
11. To identify different machine parts through mill visit.
12. To study the working mechanism of airjet loom through mill visit.

RECOMMENDED BOOKS

1. Weaving Mechanism, Vol.-II by Prof. N N Banerjee
2. Principles of Weaving by Mark and Robinson.
3. Principles of fabric formation by Banerjee, Prabir Kumar

RECOMMENDED WEBSITES

1. https://onlinecourses.nptel.ac.in/
2. https://swayam.gov.in/

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 DYEING TECHNOLOGY - II

L	P
2	4

RATIONALE

Textile design diploma holders must have necessary knowledge of procedures used for dyeing on different textile substrates and blends. They must have sufficient knowledge and skills about principles of dyeing operation, materials, equipment / machinery and processes involved. They should be able to execute various recipes for dyeing.

COURSE OUTCOMES

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

CO1: Learn about acid mordant and basic dyes in various applications

CO2: Describe disperse dyes on polyester with different methods and Nylon Dyeing

CO3: Use various applications in Dyeing blends with various dyes.

CO4: Acquire knowledge about Fastness Tests and eco-friendly dyeing processes.

CO5: Define various Textile machineries used in a process house

DETAILED CONTENTS

UNIT I

Acid, metal complex and Mordant Dyes – Properties and method of application

Basic dyes– Properties, mechanism and method of application

UNIT 2

Properties and application of Disperse dyes on polyester.

Carrier dyeing of Polyester, High temperature dyeing process and Thermo fixation Process. Advantages and limitations of Carrier, High temperature high pressure and Thermo fixation Process.

UNIT 3

Brief introduction and dyeing of following blends:- Poly/Cellulose, Poly / Wool, Acrylic /Wool, Cotton / Wool by different dyes combination- Disperse/ Reactive, Disperse / Vat, Disperse / Sol.Vat, Disperse / Acid, Disperse /Basic , Direct / Acid etc.

UNIT 4

Introduction to Washing Fastness: Rubbing Fastness, Light Fastness, Perspiration Fastness.

Introduction to Computer colour matching concepts. Banned dyes and chemicals in Processing Industry. Brief introduction of sustainable textile wet processing and its importance.

UNIT 5

Brief description of different machines like:

(a) Fibre dyeing: Loose cotton dyeing machine.

(b) Yarn Dyeing: Hank dyeing, Cone dyeing, Cheese dyeing machine & Warp dyeing Machine.

(c) Fabric dyeing: Jigger, HT/HP Beam dyeing m/c, Jet dyeing m/c, soft flow dyeing m/c and continuous Dyeing machine .

PRACTICALS EXERCISES

1. To dye acrylic sample with basic dye
2. To dye Silk with acid dye.
3. To dye wool sample with acid dye
4. To dye polyester by high Temperature method. (To be performed in industry/ other educational institutes).
5. To study the dyeing of Polyester with carrier method.
6. Dyeing of polyester/cotton blend with disperse / reactive dye. (To be performed in industry/ other educational institutes).
7. Dyeing of P/V blend with disperse / reactive dye. (To be performed in industry/ other educational institutes).
8. To dye Nylon by Acid Dye. (To be performed in industry/ other educational institutes).
9. Industrial visit for demonstration of dyeing of blends. (To be performed in industry/ other educational institutes).
10. To Dye Acrylic/wool blend (three dyes).
11. Dyeing of Terry/wool blend (three dyes).
12. To study color fastness: washing, rubbing, Light, Perspiration
13. Industrial visit for demonstration of dyeing of blends.

RECOMMENDED BOOKS

1 V.A. Shenai, “Technology of Dyeing”, Sevak Publishers Mumabi.
2. E.R Trotman, “Dyeing and Chemical Technology of Fibrous Material”, B.I. Production, New Delhi.

3. Arora, “A Text Book of Dyes”.
4. R.S. Paryag, “Dyeing and Synthetic Fabrics”.
5. James, “Printing and Dyeing of Fabrics”.
6. Charlese Pellow, “Dyes and Dyeing”, Abhishek Publishers, Chandigarh.

RECOMMENDED WEBSITES

1. https://textilelearner.net/dyeing-of-polyester-fabric-with-disperse-dyes/
2. https://textiletuts.com/how-to-dye-acrylic-yarn-and-fabric/

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. The students should be taken to dyeing industry to show them various dyeing processes of dyeing and its machinery.

5.5 TESTING AND QUALITY CONTROL – II

L	P
2	4

RATIONALE

Textile design diploma students are responsible for testing and quality control of yarn and fabric at the shop floor. This subject will help the students to learn about the different physical properties of fabrics and their importance. They will get aware of the working principle of different testing equipment used for physical testing of fabrics. In this subject, student will be made fully aware of different quality standards and their maintenance during manufacturing processes for the total quality concept.

COURSE OUTCOMES

After undergoing this subject, the students will be able to:
CO1: Learn the importance of single yarn strength, lea strength and their measurement.
CO2: Study fabric thickness, yarn crimp, fabric weight, cover factor and their measurement.
CO3: Acquire knowledge about different fabric strengths and their measurement.
CO4: Describe about fabric stiffness, handle and drape, crease recovery, pilling and their measurement.
CO5: Define the concepts of serviceability, abrasion and its measurement and fabric defects.

DETAILED CONTENTS

UNIT1

Yarn Strength Testing - Single yarn strength and its importance, CRL and CRE principles. Single yarn strength tester of CRT principle. Lea strength, count strength product (CSP), its measurement.

UNIT2

Fabric thickness, measurement of warp and weft crimp and its measurement by crimp meter, fabric weight (GSM) and its measurement. Cover factor of fabric.

UNIT3

Fabric Strength- introduction, tensile strength and its measurement by cut strip method, revealed stripe method and grab method. Tearing strength testing and its measurement by Elmendorf tearing tester. Bursting strength and its measurement.

UNIT 4

Introduction of fabric stiffness, handle and drape. Measurement of fabric stiffness. Drape meter and its working. Crease recovery and its measurement. Pilling of fabric and its measurement.

UNIT 5

Concepts of serviceability, wear and abrasion and its measurement by Martindale Abrasion tester. Common fabric defects, their analysis and remedial measures. Identification of Fabric faults.

PRACTICAL EXERCISES

1. To Measure the single yarn strength by single thread strength tester.
2. To determine CSP of given yarn with the help of lea strength tester.
3. To perform fabric thickness test using fabric thickness tester.
4. Determination of fabric weight (GSM) by round cutter.
5. To find out the fabric weight (GSM) by quadrant balance.
6. To measure the tensile strength by revelled and cut stripe method.
7. Determination of tearing strength by Elmendorf tearing tester.
8. To determine tearing strength of a given fabric by tongue tear tester.
9. To determine fabric stiffness by Shirley stiffness tester.
10. To perform crease recovery test of a fabric by Shirley crease recovery tester.
11. To measure pilling resistance of a fabric by ICI pill box tester.
12. To determine drape of a fabric by drapemeter.

RECOMMENDED BOOKS

1 Textile Testing by JE Booth
2. Textile Testing by Grover and Hamley
3. Textile Testing by Angapan
4. Textile Testing by John H.Skinkle; DB Taraporewala and Sons, Bombay

RECOMMENDED WEBSITES

1. https://onlinecourses.nptel.ac.in/
2. https://swayam.gov.in/

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. Students must be taken to textile industries/Mills for practice and study of inspection and quality control operations so that they are aware of the practices being followed in the industry.

5.6 COMPUTER AIDED TEXTILE DESIGN – I

L	P
-	6

RATIONALE

The term CAD has found its way into all major disciplines that has got anything to do with designing or drafting techniques. This subject will help the students to acquire the knowledge of making different dobby and jacquard designs using CAD software in textile industry. It will help the students to use software in the design and construction of various textiles.

COURSE OUTCOMES

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

CO1: Handle CorelDraw designing tools.
CO2: Create the designs with the help of relevant software.
CO3: Use various tools of adobe Photoshop to create textile design.
CO4: Perform the formation of designs using different tools.
CO5: Visualize various applications of CAD in textile designing.

PRACTICAL EXERCISES

UNIT 1

Introduction to various CAD Software in the field of Textile design – Adobe Photoshop, Corel Draw, Illustrator, Ned Graphics, Color Matters etc.

UNIT 2

Detailed study of tools of Corel Draw - Pick tools, Edit shape tools, Crop tools, Zoom tools, Curve tools, Drawing tools, Rectangle tools, Ellipse tools, Shape tools, Text tools, Dimension tools, Connector tools, Effect tools, Transparency tool, Eyedropper tools, Fill tools.

UNIT 3

Introduction to various tools of Adobe Photoshop – Selection tools, Crop and slice tools, Measuring tools, Retouching tools, Painting tools, Drawing and type tools, Navigation tools.

UNIT 4

Formation of designs using different tools and application of design on graph paper. Application and selection of suitable colours for a particular design. Scan a design with the help of Photoshop. Change of colour scheme of the design.

UNIT 5

Application of tools of Corel Draw and Adobe Photoshop in textile designing and development. Enlargement and reduction of design.

RECOMMENDED BOOKS

1. Literature from the supplier of each software can be consulted
2. CorelDraw12–BPB Publication (latest version)
3. AdobePhotoshop5.5-BPB Publication (latest version)

RECOMMENDED WEBSITES

1. Corel DRAW Graphics Suite 2021 Quick Start Guide
2. www.coreldraw.com/en/learn/tutorials/#ctg-apparel
3. Adobe Photoshop Learn & Support
4. http://swayam.gov.in

INSTRUCTIONAL STRATEGY

This is hands on practice based subject and practical exercises should be practiced in the lab regularly for development of required skills using CorelDraw and Adobe Photoshop among the students. This subject contains five units of equal weightage.

5.7 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 offlinemode. The assessment of offline multidisciplinary elective shall be internal and external. The offlinemultidisciplinary 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/

SIXTH SEMESTER

6.1 HUMANITIES & LIFE SKILLS

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3	-

RATIONALE

It is important to facilitate the development of a holistic perspective among students towards life and profession, as well as towards happiness and prosperity, based on a correct understanding of the human reality and the rest of existence. This course is designed to help students understand the importance of values and ethics in their development as professionals, responsible citizens and understand the significance of emotional intelligence in self-growth and building effective relationships. Understanding the value of harmonious relationship based on trust and respect in their life and profession, they will better be able to ensure harmony in society and nature.

COURSE OUTCOMES

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

CO1: Discover personal competence and techniques of building emotional intelligence.

CO2: Demonstrate a set of non-cognitive skills such as empathy, teamwork, collaboration, interpersonal skills, and resilience for smooth and efficient functioning at the workplace

CO3: Demonstrate the dynamics of individual, interpersonal and group processes that influence behaviour within teams and organizations.

CO4: Reflect ethical behaviour with a sense of right and wrong leading to practical ethical behaviour.

CO5: Demonstrate leadership qualities with balance of emotional and social quotient.

DETAILED CONTENTS

UNIT-I

Personal and Social Competence

Introduction and concept of emotional intelligence, its models and components, understand the significance of emotional intelligence in self-growth and building effective relationships.

Building blocks to develop emotional intelligence: self-awareness, self-management, social awareness, and relationship management.

Self-Awareness: Observing and recognizing one's own feelings, Knowing one's strengths and areas of development. Self-Management: Managing emotions, anxiety, fear, and anger.
Social Awareness: Others' Perspectives, Empathy and Compassion
Relationship Management: Collaboration, Teamwork, and Conflict management

UNIT II

Developing Professional Skills

Process of Career Exploration, Knowing Yourself — Personal Characteristics, Knowledge about the World of Work, Requirements of Jobs Including Self-employment, Sources of Career Information, Preparing for a Career Based on Potentials of Learners and Availability of Opportunities.
Career Skills: Introduction and significance of Résumé and Related Terms, Difference between a CV, Résumé, and Biodata, Essential Components and format of a Good Résumé.
Group discussions Meaning and Importance of Group Discussion Types of Group Discussions, Format of a Group Discussion, Evaluation of Group Discussion, Common Errors and tips to crack Group discussion.
Preparation for interviews, Types of Interviews, STAR Approach for Facing an Interview, Common Errors, tips to crack Interview.

UNIT III

Interpersonal Skills

Variants of Interpersonal Skills
Teamwork: Meaning, Advantages of Using Teams, Factors Contributing to the Success of a Team, Strategies to Deal with Conflict among Team Members.
Collaboration: Meaning, Types of Collaboration, Team collaboration, Network collaboration, Video collaboration, Cloud collaboration, Contextual collaboration, Cross-functional collaboration, Community collaboration, Social collaboration, Virtual collaboration, Process of Collaborative Learning
Introduction to Perseverance, Self-Control, Peer Pressure, Aspects of Social and Cultural Etiquette in Promoting Teamwork, Mannerism and Grooming.

UNIT IV

Values and Professional Ethics

Importance of ethics, Code of Ethics- Concept & Significance, Personal and professional moral codes of conduct of an Engineer

Work Ethics: Punctuality, Cleanliness Law abidingness and work place behaviour and professional ethics

Multinational corporations - Environmental ethics - computer ethics - - engineers as managers-moral leadership. Concept of Ethical leadership.

UNIT V

Leadership and Management Skills

Leadership and Its Importance, Models of Leadership, Basic Leadership Skills: Motivation, Teamwork, Negotiation, Networking, Innovative Leadership

Basic Managerial and Life Skills: Planning for Effective Management, Time Management, Conflict and Stress Management

Self-Management Skills: Time Management, Stress Management, Developing Self-Awareness with JOHARI Window, Self-examination and Self-regulation, Scope of Leadership in college

RECOMMENDED BOOKS

1. Goleman, D " Emotional Intelligence", New Delhi: Bloomsbury Publishing India Private Limited.
2. Robbins, S. P., Coulter M., and Fernandez, " Management (14th edition). Noida, India: Pearson Education.
3. Premvir Kapoor, "Professional Ethics and Human Values", Khanna Book Publishing, New Delhi, 2022.
4. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
5. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw-Hill, New York 1996.

SUGGESTED WEBSITES

1. https://ipindia.gov.in/
2. Knowledge at Wharton. (2008, April 3). APJ Abdul Kalam:"A Leader should know how to manage failure". https://www.youtube.com/watch?v=laGZaS4sdeU.

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. In addition, different activities group discussions, mock interviews, resume presentation, role play, extension lecturers by outside experts, may also be organised. This subject contains five units of equal weightage.

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.

SUGGESTED 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 – I
6.3.1 KNITTED DESIGN

L	P
3	-

RATIONALE

This subject will impart knowledge regarding various types of knits and their use in the textile design as students may have to work in knitting industries, import and export houses. The students will learn different types of stitches and their preparation. They will be able to work on flat bed and circular weft knitting machines. Students will acquire knowledge about the working principle of warp knitting machines like Raschel and Triicot.

COURSE OUTCOMES

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

CO1: Understand about different types of knitting and difference between knitting and weaving.

CO2: Acquire knowledge of various functions of the Knitting technologies.

CO3: Explain different weft knit structures, their characteristics and different mechanisms of flat bed and circular weft knitting machines.

CO4: Learn the different problem & understand the quality aspects for the knitting.

CO5: Study the warp knitting machines for knitting industries.

DETAILED CONTENTS

UNIT 1

Comparison between knitted and woven fabrics, warp and weft knitting- Types of knitting needles, their knitting cycle, advantages and disadvantages of each.

UNIT II

Weft Knitting -Types of stitches: Knit, tuck, float, lay their representation, effects, methods of formation and their end uses. Preparation of knit tuck and float stitches.

UNIT III

Weft knit structures: Plain, Rib, Interlock and Purl, their characteristics, representation, derivatives, end uses and knitting cycles. Passage of yarn through Flat Bed and Circular Weft Knitting Machines. Design of plain, rib, interlock and purl knits.

UNIT IV

Fabric defect in weft knitting, cover factor/tightness factor, Robbing back. Warp Knitting: Introduction to under lap and overlap, closed lap and open lap. Fabrics lapping movement design of warp knitting

UNIT V

Classification of warp knitting and their scope and uses, Introduction to Tricot and Raschel warp knitting machine, knitting of Tricot and Raschel knitting machine, working principle and pattern mechanism in Tricot and Raschel warp knitting machine.

RECOMMENDED BOOKS

1. Knitting technologies by D.B. Ajgaonkar
2. Knitting technology by David J. Spencer
3. Textile Mathematics Vol III by J.E. Booth

RECOMMENDED WEBSITES

1. https://onlinecourses.nptel.ac.in/
2. https://swayam.gov.in/

INSTRUCTIONAL STRATEGY

This subject includes five units of equal weightage. Student may be asked to do the work on weft knitting machines and construct the lapping movements of warp knits.

6.3.2 NON-WOVEN TECHNOLOGY

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3	-

RATIONALE

Textile design students are expected to have knowledge regarding various types of non-woven on the basis of their manufacturing processes, different web formation techniques and their features. This subject will help the students to acquire knowledge about different non-woven bonding techniques to produce laminated and composite non-woven materials. The students will acquire competency for production of mechanical and thermal bonded non-woven.

COURSE OUTCOMES

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

CO1. Understand the importance of the nonwoven fabrics.
CO2. Learn the problems occurred during manufacturing of nonwovens.
CO3. Explain the different structure of nonwovens.
CO4. Study the physical and mechanical behavior of nonwovens.
CO5. Acquire knowledge about the principle & manufacturing process of hydro entangled nonwoven fabrics.

DETAILED CONTENTS

UNIT I

Introduction of Nonwovens Historical background of nonwovens, definition, stages in Nonwoven manufacturing, Web Forming Techniques: carding parallel laid web and cross laid web. Classification of nonwoven– on the basis of use, manufacturing process, web formation and bonding.

UNIT II

Webs Formation Techniques Dry laid webs -fibre selection, fibre preparation, web formation and layering. Wet laid nonwoven -Raw materials, production process, special features of the wet laid process and its product. Spun laced webs

UNIT III

Nonwoven Bonding Techniques Introduction of bonding techniques. Mechanical bonding, adhesive bonding (Chemical bonding) and Thermal bonding. Elementary idea of production of laminated and composite nonwoven material.

UNIT IV

Mechanical and Thermal Bonded Nonwovens Mechanically bonded webs - needle punched nonwovens, Application of needle punching, stitch bonded nonwovens, applications. Thermally bonded nonwovens - binder, binding fibers, binding powder, binding webs, methods of thermal bonding - Hot calendaring, belt Calendaring, oven bonding, ultrasonic bonding, and radiant heat bonding.

UNIT V

Hydro Entanglement and Spun Lace Nonwovens. Hydro entangled nonwovens, advantages and disadvantages, Bonding process, water system, web drying, properties of spun laced webs, applications.

RECOMMENDED BOOKS

1. Nonwoven Process Performance & Testing by Turbak,
2. Handbook of Non-wovens by Stephen Russell, Woodhead Publishing Ltd.
3. Manual of Nonwovens by R.Krecma, The Textile Trade Press,
4. Thermal Bonding of Nonwoven Fabrics, Textile Progress 26 (2), 1-38, 1995.
5. Developments in Nonwoven Fabrics, Textile Progress, Vol. 12, No. 4, The Textile Institute

RECOMMENDED WEBSITES

1. https://onlinecourses.nptel.ac.in/
2. https://swayam.gov.in/

INSTRUCTIONAL STRATEGY

This subject includes five units of equal weightage. Teacher is required to explain the concept and its application keeping in view the practical / Industrial approach.

6.3.3 TECHNICAL TEXTILES

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3	-

RATIONALE

Textile Students are expected to have good knowledge about the textile materials and their production used in different fields other than apparel like geo textiles, medical textiles, sports textiles etc. This subject will help the students to get a basic outlook of this kind of textiles being used in these fields, their properties and applications.

COURSE OUTCOMES:

At the end of the course students will be able to:

CO1. Acquire brief knowledge of technical fibers, composite materials and their uses.
CO2. Learn about medical and protective textiles.
CO3. Study various Functional requirement of sports and automobile textiles.
CO4. Understand about Geogrid, Geomembrane and Geocomposite and their properties.
CO5. Explore About functional requirements and types of textiles used for agricultural, electronics and power transmission.

DETAILED CONTENTS

UNIT-I

Introduction: Definition and scope of Technical Textiles, Brief idea about technical fibres, composite materials and uses. Filtration Textiles: Textiles as filter media. Characteristics of filter material. Application of woven, nonwoven and knitted fabric in filter media.

UNIT-II

Medical Textiles: Introduction, Classification of Medical textiles, Textiles as hygienic products. Description of different Medical Textiles. Introduction to protective clothing, functional requirement of textiles in defense. Brief idea about ballistic protective clothing including parachute cloth, Chemical protective clothing, flame retardant fabrics. water proof breathable fabrics.

UNIT-III

Sports Textiles: Introduction, Functional requirement of different types of products.
Automotive Textiles: Application of textiles in automobiles, requirement and design for different tyres, airbags and belts, Properties of textiles used in these applications.

UNIT-IV

Geo textiles: Brief idea about geosynthetic. Geogrid, Geomembrane and Geocomposite. Geo textiles properties and test methods. Geo textiles - functions and mechanism in separation, reinforcement, stabilization filtration & drainage.

UNIT-V

Functional requirements and types of textiles used for agricultural, electronics, power transmission belting, hoses, canvas covers and tarpaulins.

RECOMMENDED BOOKS

1. V. K. Kothari (Ed), Technical Textiles, IAFL Publications, New Delhi, 2008.
2. R. Horrocks and S. C. Anand, Handbook of Technical Textiles, Woodhead Publishin Limited, Cambridge, 2000.
3. Khatwani, P.A., Yardi, S.S NCUTE - Programme on Technical textiles Nodal Centre for Upgradation of Textile Education- IITDelhi, February 2-3, 2002.
4. Bajaj, P. and Sengupta, A.G. Industrial applications of Textiles: Textile for filtration and coated fabrics.
5. Moorthi, P. Madhava and Guruprasad Sunder Shetty Non Woven Mahajan Publisher Pvt. Ltd., Ahmedabad ISBN 81-85401-25-X.
6. Gulrajani, M. L. Non-woven The Textile Institute.

RECOMMENDED WEBSITES

1. https://onlinecourses.nptel.ac.in/
2. https://swayam.gov.in/

INSTRUCTIONAL STRATEGY

This subject includes five units of equal weightage. Teacher is expected to cover the topics keeping in view the industrial approach. They should be taken for industry visit to demonstrate various processes.

6.4 PROGRAMME ELECTIVE - II
6.4.1 GARMENT PROCESSING

L	P
3	-

RATIONALE

Textile design students must know about the various fabric materials and preparatory processes used in garment industries. This subject will help the students to acquire knowledge about denim dyeing, denim finishing and denim washing. They will also get exposure about the various fabric materials, preparatory finishing and after-care processes / chemicals related to garments.

COURSE OUTCOMES

At the end of the course students will be able to:

CO1. Learn about various fabric materials used in garment manufacturing industries.
CO2. Acquire knowledge about stain removal procedures for various applications.
CO3. Study different denim dyeing techniques and advancements.
CO4. Explore different concepts of finishing denim fabrics.
CO5. Understand the washing procedure of denim garments.

DETAILED CONTENTS

UNIT I

Aim and scope of garment field with special reference to Textile Processors. Study of various fabric materials used in Garment Manufacturing. Laundering: Objective, Laundering procedures for various fibre fabrics i.e. cotton and Linen, Woolen, Silks & Synthetics, various laundry equipments used in commercial laundries.

UNIT II

Stain Removal: Object (with reference to garment processing), General procedure of stain removal. Classification of stains. Principles of stain removing. Classification of stain removers. Application techniques for stain removers; i) Local application ii) Bulk application.

Dry Cleaning: General introduction, objective and principle of the dry cleaning process,

Dry cleaning chemicals, detailed description of dry cleaning operations (sequential steps)

UNIT III

Denim dyeing:- Introduction to denim fabrics and its particulars. History and chemistry of Indigo dyes, Denim dyeing on continuous Indigo dyeing range. Indigo Dyeing Machine for: 1. Rope Form dyeing, 2. Sheet Form Dyeing, 3. Loop form

Advancement in Indigo dyeing method machine and precautions, merits, demerits of these M/c. Dyeing of denim fabrics with mixture of Indigo and other dyes.

UNIT IV

Finishing of garment made from denim fabric: - Different concepts of finishing denim fabrics. Preshrinking of denim, integrated finishing and shrinking range, sanfor set process for wrinkle free finish, skewing, New finishing line for denim.

UNIT V

Washing of denim fabrics/garments:

- Objectives of washing treatments.
- Brief discussion on following type of washing processes.

a) Stone wash

b) Acid wash

c) Enzyme wash

d) Overdyed denim

e) Quick wash denims and their advantage

f) Definition of the following: uncommon denim like Aqua wash denim, black denim, crushed denim, dirty blue denim, double dyed denim, eco denim, destroyed effect, wash out denim, sandblasted, sun washing, marble denim, vintage, Icewash, camelon denim, dark wash denim, printed and engraved denim, denim blended with synthetic, tie dyed denim., Back staining, Blue white contrast in denim, Ozone fading of denims

RECOMMENDED BOOKS

1. Denim for All by S.S. Satsangi & Dr. Parmar, NITRA
2. Garment Finishing & Care Labelling by S.S. Satsangi Usha publishers 53-B/ACIV, Shalimar Bagh Delhi
3. Stain Removing Techniques by S.S. Satsangi; Usha Publishers 53-B/AC-IV Shalimar Bagh, Delhi

4. Fabric Care by Noemia D'SOUZA ,New age International Publisher, Dryagang, New Delhi
5. Changing Trends in Apparal Industry by N.S. Kaplan; Abhishek Publication, Chandigarh
6. Dry Cleaning, Souring, Dyeing of Garments, Furs and Rugs by Brannt; Abhishek Publication, Chandigarh

RECOMMENDED WEBSITES

1. https://onlinecourses.nptel.ac.in/
2. https://swayam.gov.in/

INSTRUCTIONAL STRATEGY

This subject includes five units of equal weightage. Use of audiovisual aids should be made to show specialized operations. Expose the students to real life problems. Stress should be given to acquaint the students with relevant industrial practices.

6.4.2 MERCHANDISING AND EXPORT MANAGEMENT

L	P
3	-

RATIONALE

Textile design students are expected to have knowledge regarding basic concepts of merchandising and apparel exports. In this subject, students will learn about recent advancements in garment manufacturing technology, current challenges in textile industry, sustainable supply chain & it's importance. They will also acquire knowledge about export documentation, terms of payment, shipment modes and basic concepts of sourcing.

COURSE OUTCOMES

At the end of the course students will be able to:

CO1. Understand the scope, nature, importance and functions of merchandising

CO2. Study planning and control tools, executing planning action plan and preparation of PPM file.

CO3. Learn about costing and pricing formula and strategies, fabric consumption calculation and development of costing sheet.

CO4. Acquire knowledge about selection and management of vendor for sourcing and various import / export documentation.

CO5. Explore the sourcing process and role of merchandiser in sourcing process

DETAILED CONTENTS

UNIT 1

Merchandising in apparel industry

Role of fashion merchandiser, production merchandiser, retail merchandiser, importance of communication skills in merchandising, types of buyers, need for apparel exports. Apparel analysis process.

UNIT II

Overview of Clothing Industry

Trends in the global textile& apparel industry, recent advancements in garment manufacturing technology, current challenges in textile industry, sustainable supply chain & it's importance

UNIT III

Export Procedure Documentation

Need of export documentation, Types of export documents-commercial & regulatory, terms of payment - letter of credit, documents against acceptance, documents against payment, Inco terms like free on board, cost insurance freight. Shipment modes - types of load, types of containers. Export finance, pre-shipment inspection agencies, Internal documents of merchandiser.

UNIT IV

Apparel Costing For Merchandiser

Elements of cost-direct & indirect, Factors influencing costing process, process cost calculation, examples to calculate different process cost like fabric cost, processing cost, garmenting cost etc.

UNIT V

Sourcing For Merchandiser

Definition of sourcing, sourcing process in apparel industry, different type of vendors, sourcing strategies for decision making, sourcing destinations in India and world, role of merchandiser in sourcing, factors affecting sourcing process. Vendor management - criteria for vendor selection, vendor evaluation, different supplier types in apparel industry.

RECOMMENDED BOOKS

1. Principles of marketing - Philip Kotler
2. Apparel Merchandising by R.Rathinamoorthy & R.Surjit, Woodhead Publishing I.Ltd
3. The global textile & clothing industry-Technological Advances & Future Challenges by R.Shishoo, Woodhead Publishing I.Ltd.
4. Textiled and apparel in the international economy - K.G. Dickerson
5. Fashion Marketing, Mike Easey
6. Fashion Merchandising, Alaine Stone, Jean and samples.
7. Fashion from concept to consumer by Gini frings, Prentice Hall publication

RECOMMENDED WEBSITES

1. https://onlinecourses.nptel.ac.in/
2. https://swayam.gov.in/

INSTRUCTIONAL STRATEGY

This subject includes five units of equal weightage. Use of audiovisual aids should be made to show specialized operations. Expose the students to real life problems. Stress should be given to acquaint the students with relevant industrial practices.

6.4.3 PROCESS HOUSE MANAGEMENT

L	P
3	-

RATIONALE

Diploma holders in textile design are responsible for production, planning and control. This subject will help the students to acquire knowledge about the basic concepts of plant layout, record keeping, inventory control and material Handling. Students will also learn about accidents & safety measures, cost estimation, environment protection, water energy source & its conservation.

COURSE OUTCOMES

At the end of the course students will be able to:

CO1. Understand the basic concepts of plant layout their types and affecting factors.
CO2. Study different types of production, process planning and record keeping.
CO3. Learn different types of maintenance-procedures and material handling.
CO4. Acquire knowledge about the cost estimation and effluent treatment.
CO5. Explore basic methods of minimizing water & steam consumption.

DETAILED CONTENTS

UNIT 1

Plant Layout

- Concept of plant layout
- Types of layout (process, product and combination type)
- Factors affecting plant layout

UNIT II

Production

- Types of production-mass production, job production and batch production
- Material planning and allocation
- Process planning and process sheet

- Record keeping regarding men, materials and machine
- Inventory control: need of inventory control, levels in inventory control.
- Duty & responsibility of shift incharge

UNIT III

Maintenance

- Objective and importance of maintenance
- Types of maintenance-procedures and advantages

Material Handling

- Importance of material handling in a process house
- Handling of dyes & chemicals - methods & precautions
- Benefited systems of handling of processed goods.

Accidents & safety measures

- Types of accidents-fire, mechanical & chemical accidents
- Common sources of different types of accidents and their prevention
- Methods of minimizing the accidents in a process house.

UNIT IV

Cost Estimation

- Introduction and function of cost estimation
- Estimation procedure
- Elements of cost.

Environment Protection

- Important effluent characteristics- their effect on environment
- Tolerance limit enforced by state Pollution Boards & its purpose.
- Characteristics of process waste streams-process, possible pollutants & nature of waste water
- Methods of disposal of industrial waste (from dye house & print house specially)
- Various methods of effluent treatment
- Design layout & functioning of an effluent treatment plant
- Red listed dyes & chemicals

UNIT V

Water Energy (Steam) Source & its conservation

- Steam and water consumption
- Reutilization of water
- Recovery of chemicals from waste water

- Methods of minimizing water & steam consumption
Need & scope of suitable ventilation & lightening system in a process house

RECOMMENDED BOOKS

1. Art of Dyeing by B.S. Chauhan.
2. Health hazards in a Textile Mill by NITRA.
3. Dye House Management; Colour Publication, Bombay.
4. Modern Textile Management by J.B. Rattan; Abhishek Publication, Chandigarh.
5. Water and Effluents in Textile Mills by ATIRA.
6. Energy Conservation in Textile Wet Processing by Dr. M.L. Gulrajani; Mahajan Publication Pvt. Ltd., Ahemdabad.

RECOMMENDED WEBSITES

1. https://onlinecourses.nptel.ac.in/
2. https://swayam.gov.in/

INSTRUCTIONAL STRATEGY

This subject includes five units of equal weightage. The teacher should lay emphasis on understanding of basic concepts and various terms used in the subject. The teacher is expected to teach all the students the application of this subject area in various fields.

6.5 COMPUTER AIDED TEXTILE DESIGN – II

L	P
-	6

RATIONALE

This subject will further impart knowledge of software tools for drawing & printing of Motifs design for Dobby & Jacquard Design and application of the same in fabric & garments. This subject will further expose the students to different software available in the field of textile industry for design and construction of various textiles.

COURSE OUTCOMES

At the end of the course students will be able to:

CO1: Use different kind decorative and innovative of designs
CO2: Present different weave structure with styling.
CO3: Develop the skills to use Ned graphic for jacquard designing.
CO4: Create the dobby designs with the help of CAD Ned graphic software.
CO5: Perform modification of weaves, checks designs using software.

PRACTICAL EXERCISES

UNIT I

Philosophy and utility of CAD system, working with various standard software packages like photoshop, coral draw. Understanding graphic representation, file conversion, drawing simple geometric figures, capturing a picture using CCD/Scanner.

UNIT II

Software packages like Textronics/ Texstylers/ Wonderweave/ Scotweave /Ned Graphics for preparation of Woven/Knitted Fabric Construction and Design.

UNIT III

Development of Prints for Jacquard design by CAD Ned graphics. Use of computer to construct design on different bases with reference to various arrangements for woven designs.

UNIT IV

Development of Prints for Dobby Design by CAD Ned graphic. Use of CAD in various end uses viz a viz dress material, upholstery, furnishing, label, and embroidery.

UNIT V

Modify/editing fabric design from original fabric and looking at the effect of modification (modification could be on yarn count, colour, twist, and its direction; fabric drafting and lifting plan) Developing more forms of weave, stripes, Checks, Colour & Weave effects. Draping & Styling of digital woven fabric in digital form.

RECOMMENDED BOOKS

1. Literature from the supplier of each software can be consulted
2. Nedgraphic software for Textile & Fashion Home Furnishing Overview By Amit Mittal
3. Digital Jacquard Design, by Julie Holyoke
4. CorelDraw12–BPB Publication (latest version)
5. AdobePhotoshop5.5-BPB Publication (latest version)

RECOMMENDED WEBSITES

1. Corel DRAW Graphics Suite 2021 Quick Start Guide
2. www.coreldraw.com/en/learn/tutorials/#ctg-apparel
3. Adobe Photoshop Learn & Support
4. http://swayam.gov.in

INSTRUCTIONAL STRATEGY

This is hands on practice based subject and practical exercises should be practiced in the lab regularly for development of required skills using CorelDraw and Adobe Photoshop in the students. This subject contains five units of equal weightage.

6.6 MAJOR PROJECT/INDUSTRIAL TRAINING

L	P
-	16

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 trainng 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. Desh Deepak Aggarwal, Senior Lecturer, Department of Textile Design, Government Polytechnic, Hisar.
12. Mr. Yashwant Singh, Lecturer, Department of Textile Design, Government Polytechnic, Hisar.
13. Ms. Shruti Nigam, Founder, Department of Textile Design, Yellow Stitch, Mohali.
14. Ms. Radhika Sen, Creative Associate, Department of Fashion Design, Byju & Whitehatjr, Banglore.
15. Mr. Dharmender Sharma, Manager, Department of Production, DCM, Hisar.

16. Mr. Rajinder, Executive, Department of Purchase, Vardhman Textiles Limited, Ludhiana
17. Mr. Naveen Bhutani, General Manager, Quality Department, Richa Global Exports Pvt. Ltd., Mansesar, Gurgaon
18. Mr. Balram Maurya, Manager, Marketing and Merchandising, Faridabad, Haryana
19. Sh. Rohit KhaNna, Managing Director, KISCO India Private Ltd., Chandigarh.
20. Ms. Vijay Lakshami, Assistant Professor, NIFT Kannur, Kerela
21. Ms. Pallabi Das, Assistant Professor, NIFT Daman Deu
22. Dr. Sangeeta, Ex. Associate Professor, Home Science College, Chandigarh.
23. Ms. Anila, Assistant Professor, Home Science College, Chandigarh.
24. Dr. Amit Madhu, Assistant Professor, TIET, Bhiwani, Haryana.
25. Dr. Sandeep Sachan, Director, NIFT, Daman Deu
26. Smt. Pushpa Rani, Senior Lecturer, Applied Science Department, Government Polytechnic, Sonipat, Haryana.
27. Smt. Krishna Bhoria, Lecturer, Applied Science Department, Government Polytechnic, Ambala, Haryana.
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37. Sh. Anil Nain, Lecturer, Applied Science Department, Government Polytechnic, Hisar, Haryana.
38. Dr. Sarita Mann, Lecturer, Applied Science Department, Government Polytechnic, Ambala, Haryana.
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40. Dr. Vidhi Grover, Lecturer, Applied Science Department, Seth Jai Parkash Polytechnic, Damla.
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42. Ms. Sunita Rani, Lecturer, Applied Science Department, Government Polytechnic, Ambala.
43. Dr. KG Srinivasa, Professor CSE, IIIT-Naya Raipur
44. Dr. Pankaj Sharma, Professor, Applied Science Department, NITTTR, Chandigarh.

45. Dr. Ashok Kumar, Associate Professor, Applied Science Department, NITTTR, Chandigarh.
46. Dr. KC Lachhwani, Assistant Professor, Applied Science, NITTTR, Chandigarh.
47. Dr. Rajesh Mehra, Professor and Head, Curriculum Development Centre, NITTTR, Chandigarh.
48. Dr. AB Gupta, Professor and Head, Education & Educational Management Department, NITTTR, Chandigarh.
49. Er. PK Singla, Associate Professor, Curriculum Development Centre, NITTTR, Chandigarh.
50. Dr. SK Gupta, Associate Professor, Curriculum Development Centre, NITTTR, Chandigarh.
51. Dr. Meenakshi Sood, Associate Professor, Curriculum Development Centre, NITTTR, Chandigarh.

27. APPENDIX

Sr. No.	LIST OF EQUIPMENT
1.	Pilling Tester
2.	Abrasion Tester
3.	Round Cutter
4.	Drape meter
5.	Bursting Strength
6.	Grey scale
7.	Perspiration Tester
8.	Tearing Strength Tester
9.	Thickness Tester
10.	Stiffness Tester
11.	Crease recovery tester
12.	Dry and wet bulb thermometer
13.	Single Yarn twist tester
14.	Double Yarn twist tester
15.	Shrinkage Tester
16.	Stainless steel Jigger Lab Type (Manually or power operated)
17.	High Speed Stirrer with regulator
18.	Dyeing Bath (4’ x 2’ x 3’)
19.	Dyeing Rack (8’ length)
20.	PH meter
21.	Hot air Oven
22.	Beaker dyeing machine
23.	Laundrometer with Grey Scale for colour change
24.	Crock meter with Grey Scale for Staining
25.	Free hand Screen Printing Frames
26.	Tracing Tables
27.	Slanting Printing Tables
28.	Flat PrintingTable (for block printing)
29.	Autoclave for steaming
30.	Transfer Printing machine
31.	Weighing balance
32.	Wooden Blocks
33.	Color matching cabinet
34.	PCs

35.	LCD Projector
36.	Softwares: 1. Scotweave 2. Auto Tex for Weaving 3. Textronics Design Systems, 4. Coreldraw 5. Adobe Photoshop 6. Ned Graphics 7. Wonderweave


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