

**NSQF Aligned Curriculum**  
*for*  
**Three Years (Six Semester) Diploma Programme**  
**in**  
**TEXTILE ENGINEERING**  
For the State of Uttar Pradesh  
Effective from Session 2022-23



**Prepared by:**

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Corrected and Approved by BTE, U.P., Lucknow in CDC Meeting held on 19.08.2023

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## **PREFACE**

An important issue generally debated amongst the planners and educator's world over is how technical education can contribute to sustainable development of the societies struggling hard to come in the same bracket as that of the developed nations. The rapid industrialization and globalization has created an environment for free flow of information and technology through fast and efficient means. This has led to shrinking of the world, bringing people from different culture and environment together and giving rise to the concept of world turning into a global village. In India, a shift has taken place from the forgettable years of closed economy to knowledge based and open economy in the last few decades. In order to cope with the challenges of handling new technologies, materials and methods, we have to develop human resources having appropriate professional knowledge, skills and attitude. Technical education system is one of the significant components of the human resource development and has grown phenomenally during all these years. Now it is time to consolidate and infuse quality aspect through developing human resources, in the delivery system. Polytechnics play an important role in meeting the requirements of trained technical manpower for industries and field organizations. The initiatives being taken by the Technical Education, UP to revise the existing curricula of 12 diploma Programs as per the needs of the industry and making them NSQF compliant, are laudable.

In order to meet the requirements of future technical manpower, we will have to revamp our existing technical education system and one of the most important requirements is to develop outcome-based curricula of diploma Programs. The curricula for diploma Programs have been revised by adopting time-tested and nationally acclaimed scientific method, laying emphasis on the identification of learning outcomes of diploma Program.

The real success of the diploma Program depends upon its effective implementation. However, best the curriculum document is designed, if it is not implemented properly, the output will not be as expected. In addition to acquisition of appropriate physical resources, the availability of motivated, competent and qualified faculty is essential for effective implementation of the curricula.

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

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Coordinator  
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## 1. SALIENT FEATURES OF DIPLOMA PROGRAMME IN TEXTILE ENGINEERING

- 1) Name of the Programme : Diploma Programme in TEXTILE ENGINEERING
- 2) Duration of the Programme : Three year (Six Semesters)
- 3) Entry Qualification : Matriculation or equivalent NSQF Level as Prescribed by State Board of Technical Education, UP.
- 4) Intake : 60 (or as prescribed by the Board)
- 5) Pattern of the Programme : Semester Pattern
- 6) NSQF Level : Level – 5
- 7) Ratio between theory and Practice : 47 : 53 (Approx.)
- 8) Industrial Training:  
Four weeks of industrial training is included after IV semester during summer vacation. Total marks allotted to industrial training will be 50.
- 9) Ecology and Environment :  
  
As per Govt. of India directives, a subject on Environmental Studies has been incorporated in the curriculum.
- 10) Energy Conservation:  
  
A subject on Energy Conservation has been incorporated in the curriculum.
- 11) Entrepreneurship Development:  
  
A full subject on Industrial Management and Entrepreneurship Development has been incorporated in the curriculum.
- 12) Student Centred Activities:  
  
A provision of 3-6 periods per week has been made for organizing Student Centred Activities for overall personality development of students. Such activities will comprise of co-curricular activities such as expert lectures, self study, games, hobby classes like photography, painting, singing etc. seminars, declamation contests, educational field visits, NCC, NSS and other cultural activities, disaster management and safety etc.
- 13) Project work  
  
A project work has been included in the curriculum to enable the student get familiarize with the practices and procedures being followed in the industries and provide an opportunity to work on some live projects in the industry.

## **2. EMPLOYMENT OPPORTUNITIES OF DIPLOMA HOLDERS IN TEXTILE ENGINEERING**

Major clusters for textile production spread all over in India from north to south and east to west such as in gujarat places like Ahmedabad, Bharuch etc, in rajasthan places like bhilwada etc.in Punjab places like barnala,ludiana, in madya pradesh places budani,chindwada etc.in west Bengal places like rishra etc There are very few colleges in India that are providing diploma engineering course in 'Textile Engineering'. Industry always required trained diploma engineers for smooth functioning and further development. The students completing this diploma course should get employment opportunities in following work profiles in different textile producing clusters on India -

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

### **3. LEARNING OUTCOMES OF THE PROGRAMME**

1. The learning outcome of a Diploma Programme in Textile Engineering typically includes a comprehensive understanding of various aspects of textile manufacturing, technology, and management. Here are some key learning outcomes you can expect from such a program:
2. **Technical Knowledge:** Graduates of the program will have a strong foundation in textile engineering principles, including knowledge of textile fibers, yarn production, fabric manufacturing processes, textile testing, and quality control.
3. **Textile Design and Development:** Students will learn about textile design techniques, including pattern making, fabric selection, dyeing, printing, and finishing. They will acquire skills to develop innovative textile products and understand the factors that influence design decisions.
4. **Manufacturing Processes:** The program will cover different textile manufacturing processes, such as weaving, knitting, nonwoven production, and garment manufacturing. Students will gain knowledge of the machinery and equipment used in these processes and learn how to optimize production efficiency.
5. **Technical Skills:** Graduates will acquire hands-on skills in operating and maintaining textile machinery, conducting textile testing and analysis, and troubleshooting manufacturing issues. They will also learn about computer-aided design (CAD) software and other relevant technologies.
6. **Sustainability and Environmental Considerations:** The program will emphasize the importance of sustainable practices in the textile industry. Students will learn about eco-friendly manufacturing processes, waste management, recycling, and reducing the environmental impact of textile production.
7. **Quality Assurance and Control:** Students will understand the principles and techniques of quality control in textile manufacturing. They will learn how to conduct tests and inspections to ensure product quality and compliance with industry standards.
8. **Project Management:** The program may include courses on project management, where students will learn how to plan, execute, and monitor textile engineering projects effectively. This includes resource allocation, cost estimation, risk assessment, and timeline management.
9. **Professional Skills:** Students will develop skills in communication, teamwork, problem-solving, and critical thinking. They will learn how to collaborate with colleagues, present their ideas, and adapt to the dynamic nature of the textile industry.
10. **Industry Knowledge:** The program may provide insights into the textile industry, its market trends, global trade, and regulatory frameworks. Students will gain an understanding of the challenges and opportunities in the industry and develop strategies for success.

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11. Ethical Considerations: Students will be introduced to ethical issues related to the textile industry, such as fair trade, labor rights, and responsible sourcing. They will learn about corporate social responsibility and the importance of ethical practices in the industry.

These learning outcomes will equip graduates of the Diploma Programme in Textile Engineering with the necessary knowledge, skills, and abilities to pursue careers in textile manufacturing, research and development, quality assurance, technical consultancy, and management positions within the textile industry.

**4. DERIVING CURRICULUM AREAS FROM LEARNING OUTCOMES OF THE PROGRAMME**

The following curriculum area subjects have been derived from learning outcomes:

<b>Curriculum Areas</b>
1. Textile Engineering Fundamentals
- Textile Fibers and Yarn Technology
- Fabric Manufacturing Processes
- Textile Testing and Quality Control
- Textile Chemistry and Dyeing
- Textile Printing and Finishing
2. Textile Design and Development
- Textile Design Principles
- Pattern Making and CAD for Textiles
- Fabric Selection and Analysis
- Fashion and Apparel Design
3. Textile Manufacturing Processes
- Weaving Technology
- Knitting Technology
- Nonwoven Production Techniques
- Garment Manufacturing and Production Management
4. Textile Machinery and Equipment
- Textile Machinery Operation and Maintenance
- Textile Machine Design and Automation
- Advanced Textile Machinery Technology
5. Textile Testing and Quality Assurance
- Textile Testing Techniques and Standards
- Quality Control in Textile Manufacturing
- Statistical Process Control
- Product Inspection and Compliance
6. Sustainable Textile Engineering
- Sustainable Textile Manufacturing Processes
- Environmental Impact Assessment
- Waste Management and Recycling
- Eco-friendly Textile Chemistry
7. Project Management in Textile Engineering
- Project Planning and Execution
- Resource Allocation and Cost Estimation

## HORIZONTAL AND VERTICAL ORGANISATION OF THE SUBJECTS

Sr. No.	Subjects	Distribution in Periods as per week in various semesters					
		I	II	III	IV	V	VI
1.	Communication Skills I & II	6	-	-	6	-	-
2.	Applied Mathematics I & II	5	5	-	-	-	-
3.	Applied Physics I & II	7	7	-	-	-	-
4.	Applied Chemistry	-	7	-	-	-	-
5.	General Mechanical Engg.	10	-	-	-	-	-
6.	Engineering Drawing	10	-	-	-	-	-
7.	Workshop Practice	-	10	-	-	-	-
8.	Textile Fibre I & II	8	6	-	-	-	-
9.	Textile Chemical Processing	-	6	-	-	-	-
10.	Electrical Technology & Electronics	-	-	7	-	-	-
11.	Yarn Technology	-	-	19	-	-	-
12.	Fabric Technology	-	-	20	-	-	-
13.	Fabric Structure & Analysis	-	-	-	-	8	-
14.	Industrial Safety	-	-	-	4	-	-
15.	Textile Testing I & II	-	-	-	10	10	-
16.	Yarn Technology-III	-	-	-	7	-	-
17.	Fabric Technology-III	-	-	-	7	-	-
18.	Basics of Information Technology	-	-	-	-	6	-
19.	Technical Textile	-	-	-	-	6	-
20.	Computer Aided Design	-	-	-	-	7	-
21.	Energy Conservation	-	-	-	5	-	-
22.	Industrial Safety	-	-	-	4	-	-
23.	Industrial Management & Entrepreneurship Development	-	-	-	-	5	-

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24.	Universal Human Values	-	-	-	-	3	-
25.	Environmental Studies	-	-	-	-	-	5
26.	Advance Fabric Structure	-	-	-	-	-	8
27.	Principle and Design of Spinning Machine	-	-	-	-	-	8
28.	Principle and design of Weaving Machine	-	-	-	-	-	8
29.	Introduction to Knitting & Garment Technology	-	-	-	-	-	8
30.	Project	-	-	-	-	-	8
31.	SCA	2	4	2	2	4	2
32.	Total	48	45	48	47	43	48

## 7. STUDY AND EVALUATION SCHEME FOR DIPLOMA PROGRAMME IN TEXTILE ENGINEERING

### FIRST SEMESTER

Sr. No.	SUBJECTS	STUDY SCHEME			Credits	MARKS IN EVALUATION SCHEME										Total Marks of Internal & External
		Periods/Week				INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT							
		L	T	P		Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot			
1.1	*Communication Skills-I	4	-	2	4	20	-	20	50	2 ½	-	-	50	70		
1.2	*Applied Mathematics-I	5	-	-	4	20	-	20	50	2 ½	-	-	50	70		
1.3	*Applied Physics – I	5	-	2	5	20	-	20	50	2 ½	-	-	50	70		
1.4	+General Mechanical Eng.	6	-	4	6	20	20	40	50	2 ½	40	3	90	130		
1.5	+Engineering Drawing	-	-	10	5	20	-	20	50	3	-	-	50	70		
1.6	+Textile Fibers-I	4	-	4	5	20	20	40	50	2 ½	40	3	90	130		
#Student Centered Activities (SCA)		-	-	2	1	-	30	30	-	-	-	-	-	30		
<b>Total</b>		<b>24</b>	<b>-</b>	<b>24</b>	<b>30</b>	<b>120</b>	<b>70</b>	<b>190</b>	<b>300</b>		<b>80</b>	<b>-</b>	<b>380</b>	<b>570</b>		

\* Common with other diploma programs

# Student Centered Activities will comprise of co-curricular activities like extension lectures, self study, games, hobby clubs e.g. photography etc., seminars, declamation contests, educational field visits, N.C.C., NSS, Cultural Activities, disaster management and safety etc.

+ Common with Textile Technology/Textile Chemistry

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## SECOND SEMESTER

Sr. No.	SUBJECTS	STUDY SCHEME			Credits	MARKS IN EVALUATION SCHEME								Total Marks of Internal & External
		Periods/Week				INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
		L	T	P		Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	
2.1	*Applied Mathematics - II	5	-	-	4	20	-	20	50	2 ½	-	-	50	70
2.2	*Applied Physics -II	5	-	2	5	20	20	40	50	2 ½	40	3	90	130
2.3	*Applied Chemistry	5	-	2	5	20	20	40	50	2 ½	40	3	90	130
2.4	+Textile Fibers-II	4	-	2	6	20	20	40	50	2 ½	40	3	90	130
2.5	Textile Chemical Processing	6	-	-	5	20	-	20	50	2 ½	-	-	50	70
2.6	+Workshop Practice	-	-	10	4	-	30	30	-	-	60	4	60	90
#Student Centered Activities (SCA)		-	-	4	1	-	30	30	-	-	-	-	-	30
<b>Total</b>		<b>25</b>	<b>-</b>	<b>20</b>	<b>30</b>	<b>100</b>	<b>120</b>	<b>220</b>	<b>300</b>		<b>80</b>	<b>-</b>	<b>380</b>	<b>650</b>

\* Common with other diploma programmes

# Student Centered Activities will comprise of co-curricular activities like extension lectures, self study, games, hobby clubs e.g. photography etc., seminars, declamation contests, educational field visits, N.C.C., NSS, Cultural Activities, disaster management and safety etc.

+ Common with Textile Technology/Textile Chemistry

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### THIRD SEMESTER

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week			Credits	MARKS IN EVALUATION SCHEME									Total Marks of Internal & External
		L	T	P		INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT						
						Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot		
3.1	Electrical Technology and Electronics	5	-	2	6	20	20	40	50	2 ½	40	3	90	130	
3.2	Yarn Technology-I	5	-	4	5	20	20	40	50	2 ½	40	3	90	130	
3.3	Yarn Technology-II	6	-	4	5	20	20	40	50	2 ½	40	-	90	130	
3.4	Fabric Technology-I	6	-	4	5	20	20	40	50	2 ½	40	-	90	130	
3.5	Fabric Technology-II	6	-	4	5	20	20	40	50	2 ½	40	-	90	130	
#Student Centred Activities (SCA)		-	-	2	1		30	30	-	-	-	-	-	30	
<b>Total</b>		<b>28</b>	<b>-</b>	<b>20</b>	<b>27</b>	<b>100</b>	<b>130</b>	<b>230</b>	<b>250</b>	<b>-</b>	<b>200</b>	<b>-</b>	<b>450</b>	<b>680</b>	

\* Common with other diploma programmes

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

#### FOURTH SEMESTER

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week			Credits	MARKS IN EVALUATION SCHEME										Total Marks of Internal & External
		L	T	P		INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT							
						Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot			
4.1	*Communication Skill-II	4	-	2	4	20	10	30	50	2 ½	20	3	70	100		
4.2	Industrial Safety	4	-	-	4	20	-	20	50	2 ½	-	-	50	70		
4.3	Textile Testing-I	6	-	4	5	20	20	40	50	2 ½	40	6	90	130		
4.4	Yarn Technology -III	6	1	-	4	20	-	20	50	2 ½	-	-	50	70		
4.5	Fabric Technology-III	6	1	-	4	20	-	20	50	2 ½	-	-	50	70		
4.6	*Basics of Information Technology	-	-	6	2	-	40	40	-	-	60	3	60	100		
4.7	*Energy Conservation	3	-	2	3	20	10	30	50	2 ½	20	3	70	100		
#Student Centred Activities (SCA)		-	-	2	1	-	30	30	-	-	-	-	-	30		
<b>Total</b>		<b>29</b>	<b>2</b>	<b>16</b>	<b>29</b>	<b>120</b>	<b>110</b>	<b>230</b>	<b>300</b>	<b>-</b>	<b>140</b>	<b>-</b>	<b>440</b>	<b>670</b>		

\* Common with other diploma programme

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



**FIFTH SEMESTER**

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week			Credits	MARKS IN EVALUATION SCHEME								Total Marks of Internal & External
		L	T	P		INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
						Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	
5.1	*Industrial Management and Entrepreneurship Development	5	-	-	4	20	-	20	50	2 ½	-	-	50	70
5.2	Textile Testing-II	4	2	4	6	20	20	40	50	2 ½	40	3	90	130
5.3	Fabric Structure & Analysis	6	2	-	4	20	-	20	50	2 ½	-	-	50	70
5.4	Technical Textile	6	-	-	3	20	-	20	50	2 ½	-	-	50	70
5.5	Computer Aided Design	5	2		4	20	-	20	50	2 ½	-	-	50	70
5.6	Universal Human Value*	2	-	1	2	-	20	20	-	-	30	3	30	50
5.7	Industrial Training-(4 Weeks)+	-	-	-	3	-	40	40	-	-	100	Viva	100	140
#Student Centred Activities (SCA)		-	-	4	2	-	30	30	-	-	-	-	-	30
<b>Total</b>		<b>29</b>	<b>6</b>	<b>9</b>	<b>28</b>	<b>80</b>	<b>150</b>	<b>230</b>	<b>200</b>	<b>-</b>	<b>230</b>	<b>-</b>	<b>430</b>	<b>660</b>

\* Common with other diploma programme

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

+ 4 weeks structured and supervised, branch specific, task oriented Industrial Training to be organised after V Semester Theory exam. Students will submit a report. There will be 60 marks for this training. These marks in VI Sem. will be awarded by the examiner. (Examination marks : 100, Sess. marks : 40 ).

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## SIXTH SEMESTER

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week			Credits	MARKS IN EVALUATION SCHEME									Total Marks of Internal & External
		L	T	P		INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT						
						Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot		
6.1	*Environmental Studies	3	-	2	3	20	10	30	50	2 ½	20	3	70	100	
6.2	Advance Fabric Structure	6	2	-	4	20	-	20	50	2 ½	-	-	50	70	
6.3	Principle and Design of Spinning Machine	6	2	-	5	20	-	20	50	2 ½	-	-	50	70	
6.4	Principle and Design of Weaving Machine	6	2		5	20	-	20	50	2 ½	-	-	50	70	
6.5	Introduction to Knitting & Garment Technology	4	-	4	4	20	20	40	50	-	40	3	90	130	
6.6	Project	-	-	8	4	-	50	50	-	-	100	Viva	100	150	
#Student Centred Activities (SCA)		-	-	2	1	-	30	30	-	-	-	-	-	30	
<b>Total</b>		<b>25</b>	<b>6</b>	<b>16</b>	<b>26</b>	<b>100</b>	<b>110</b>	<b>210</b>	<b>250</b>	<b>-</b>	<b>160</b>	<b>-</b>	<b>410</b>	<b>620</b>	

\* Common with other diploma programme

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

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**STUDY AND EVALUATION SCHEME FOR LATERAL ENTRY AND ITI PASSED STUDENTS  
DIPLOMA PROGRAMME IN ENGINEERING**

**THIRD SEMESTER**

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week			Credits	MARKS IN EVALUATION SCHEME									Total Marks of Internal & External
		L	T	P		INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT						
						Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot		
3.1	Electrical Technology and Electronics	5	-	2	6	20	20	40	50	2 ½	40	3	90	130	
3.2	Yarn Technology-I	5	-	4	5	20	20	40	50	2 ½	40	3	90	130	
3.3	Yarn Technology-II	6	-	4	5	20	20	40	50	2 ½	40	-	90	130	
3.4	Fabric Technology-I	6	-	4	5	20	20	40	50	2 ½	40	-	90	130	
3.5	Fabric Technology-II	6	-	4	5	20	20	40	50	2 ½	40	-	90	130	
#Student Centred Activities (SCA)		-	-	2	1		30	30	-	-	-	-	-	30	
<b>Total</b>		<b>28</b>	<b>-</b>	<b>20</b>	<b>27</b>	<b>100</b>	<b>130</b>	<b>230</b>	<b>250</b>	<b>-</b>	<b>200</b>	<b>-</b>	<b>450</b>	<b>680</b>	

\* Common with other diploma programmes

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

Corrected and Approved by BTE, U.P., Lucknow in CDC Meeting held on 19.08.2023

A. COMPULSORY SUBJECT OF I & II SEMESTER TEXTILE ENGINEERING TO BE TAUGHT IN III & IV Sem. TO ITI PASSED STUDENTS OF TRADES ARE AS FOLLOWS :

I.WEAVING TECHNICIAN II. TEXTILE WET PROCESSING TECHNICIAN

Sr. No.	SUBJECTS	STUDY SCHEME			Credits	MARKS IN EVALUATION SCHEME							Total Marks of Internal & External	
		Periods/Week				INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
		L	T	P		Th	Pr	Tot	Th	Hrs	Pr	Hrs		Tot
1.1	*Communication Skills-I	4	-	2	-		-	-	50	2 ½	20	3	70	70
1.2	*Applied Mathematics - I	5	-	-	-			-	50	2 ½	-	-	50	50
1.3	*Applied Physics – I	5	-	2	-		-	-	50	2 ½	20	3	70	70
		14		4	-		-	-	150		40		190	190

\* Common with other diploma programmes

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

(\*) It is compulsory to appear & to pass in examination From III Semester To VI Semester, But credit/marks will not be included for division and percentage of obtained marks.

(\*) Four Semester (Two Years) of Extra Time will be given after diploma curriculum period (If Required) to pass the above paper (1.1 To 1.3 and 2.1 to 2.3) examination (As Per G. O. No. 2221/16-Pra. Shi.-3-2009 Dated 28-08-2009) & Revised G.O. No. 2704/16-Pra.Shi.-3-2013-46(8)/2002 Dated 09-01-2013 and B.T.E Order No. Pra.Shi.Pa/C.D.C./2022/872021 Dated 21.02.22

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#### FOURTH SEMESTER

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week			Credits	MARKS IN EVALUATION SCHEME										Total Marks of Internal & External
		L	T	P		INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT							
						Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot			
4.1	*Communication Skill-II	4	-	2	4	20	10	30	50	2 ½	20	3	70	100		
4.2	Industrial Safety	4	-	-	4	20	-	20	50	2 ½	-	-	50	70		
4.3	Textile Testing-I	6	-	4	5	20	20	40	50	2 ½	40	6	90	130		
4.4	Yarn Technology -III	6	1	-	4	20	-	20	50	2 ½	-	-	50	70		
4.5	Fabric Technology-III	6	1	-	4	20	-	20	50	2 ½	-	-	50	70		
4.6	*Basics of Information Technology	-	-	6	2	-	40	40	-	-	60	3	60	100		
4.7	*Energy Conservation	3	-	2	3	20	10	30	50	2 ½	20	3	70	100		
#Student Centred Activities (SCA)		-	-	2	1	-	30	30	-	-	-	-	-	30		
<b>Total</b>		<b>29</b>	<b>2</b>	<b>16</b>	<b>29</b>	<b>120</b>	<b>110</b>	<b>230</b>	<b>300</b>	<b>-</b>	<b>140</b>	<b>-</b>	<b>440</b>	<b>670</b>		

\* Common with other diploma programme

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

B. COMPULSORY SUBJECT OF I & II SEMESTER TEXTILE TECHNOLOGY TO BE TAUGHT IN III & IV Sem. TO ITI PASSED STUDENTS OF TRADES ARE AS FOLLOWS :

II. WEAVING TECHNICIAN II. TEXTILE WET PROCESSING TECHNICIAN

Sr. No.	SUBJECTS	STUDY SCHEME			Credits	MARKS IN EVALUATION SCHEME					Total Marks of Internal & External			
		Periods/Week				INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
		L	T	P		Th	Pr	Tot	Th	Hrs		Pr	Hrs	Tot
2.1	*Applied Mathematics - II	5	-	-	-	-	-	-	50	2 ½	-	-	50	50
2.2	*Applied Physics -II	5	-	2	-	-	-	-	50	2 ½	20	3	70	70
2.3	*Applied Chemistry	5	-	2	-	-	-	-	50	2 ½	20	3	70	70
<b>Total</b>		15	-	4	-	-	-	-	150	-	40	-	190	190

\* Common with other diploma programme

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

(\* ) It is compulsory to appear & to pass in examination From III Semester To VI Semester, But credit/marks will not be included for division and percentage of obtained marks.

(\* ) Four Semester (Two Years) of Extra Time will be given after diploma curriculum period (If Required) to pass the above paper (1.1 To 1.3 and 2.1 to 2.3) examination (As Per G. O. No. 2221/16-Pra. Shi.-3-2009 Dated 28-08-2009) & Revised G.O. No. 2704/16-Pra.Shi.-3- 2013-46(8)/2002 Dated 09-01-2013 and B.T.E Order No. Pra.Shi.Pa/C.D.C./2022/872021 Dated 21.02.22

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## FIFTH SEMESTER

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week			Credits	MARKS IN EVALUATION SCHEME								Total Marks of Internal & External
		L	T	P		INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT					
						Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	
5.1	*Industrial Management and Entrepreneurship Development	5	-	-	4	20	-	20	50	2 ½	-	-	50	70
5.2	Textile Testing-II	4	2	4	6	20	20	40	50	2 ½	40	3	90	130
5.3	Fabric Structure & Analysis	6	2	-	4	20	-	20	50	2 ½	-	-	50	70
5.4	Technical Textile	6	-	-	3	20	-	20	50	2 ½	-	-	50	70
5.5	Computer Aided Design	5	2		4	20	-	20	50	2 ½	-	-	50	70
5.6	Universal Human Value*	2	-	1	2	-	20	20	-	-	30	3	30	50
5.7	Industrial Training-(4 Weeks)+	-	-	-	3	-	40	40	-	-	100	Viva	100	140
#Student Centred Activities (SCA)		-	-	4	2	-	30	30	-	-	-	-	-	30
<b>Total</b>		<b>28</b>	<b>6</b>	<b>9</b>	<b>27</b>	<b>80</b>	<b>150</b>	<b>230</b>	<b>200</b>	<b>-</b>	<b>230</b>	<b>-</b>	<b>430</b>	<b>660</b>

\* Common with other diploma programme

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

+ 4 weeks structured and supervised, branch specific, task oriented Industrial Training to be organised after V Semester Theory exam. Students will submit a report. There will be 60 marks for this training. These marks in VI Sem. will be awarded by the examiner. (Examination marks : 100, Sess. marks : 40 ).

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## SIXTH SEMESTER

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week			Credits	MARKS IN EVALUATION SCHEME									Total Marks of Internal & External
		L	T	P		INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT						
						Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot		
6.1	*Environmental Studies	3	-	2	3	20	10	30	50	2 ½	20	3	70	100	
6.2	Advance Fabric Structure	6	2	-	4	20	-	20	50	2 ½	-	-	50	70	
6.3	Principle and Design of Spinning Machine	6	2	-	5	20	-	20	50	2 ½	-	-	50	70	
6.4	Principle and Design of Weaving Machine	6	2		5	20	-	20	50	2 ½	-	-	50	70	
6.5	Introduction to Knitting & Garment Technology	4	-	4	4	20	20	40	50	-	40	3	90	130	
6.6	Project	-	-	8	4	-	50	50	-	-	100	Viva	100	150	
#Student Centred Activities (SCA)		-	-	2	1	-	30	30	-	-	-	-	-	30	
<b>Total</b>		<b>24</b>	<b>8</b>	<b>16</b>	<b>24</b>	<b>100</b>	<b>110</b>	<b>210</b>	<b>250</b>	<b>-</b>	<b>160</b>	<b>-</b>	<b>410</b>	<b>620</b>	

\* Common with other diploma programme

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



## **8. GUIDELINES FOR ASSESSMENT OF STUDENT CENTRED ACTIVITIES (SCA)**

It was discussed and decided that the maximum marks for SCA should be 30 as it involves a lot of subjectivity in the evaluation. The marks may be distributed as follows:

- i. 10 Marks for general behavior and discipline  
(by HODs in consultation with all the teachers of the department)
- ii. 5 Marks for attendance as per following:  
(by HODs in consultation with all the teachers of the department)
  - a) 75 - 80% 2 Marks
  - b) 80 - 85% 4 Marks
  - c) Above 85% 5 Marks
- iii. 15 Marks maximum for Sports/NCC/Cultural/Co-curricular/ NSS activities as per following:  
(by In-charge Sports/NCC/Cultural/Co-curricular/NSS)
  - a) 15 - State/National Level participation
  - b) 10 - Participation in two of above activities
  - c) 5 - Inter-Polytechnic level participation

Note: There should be no marks for attendance in the internal sessional of different subjects.

## First Semester

### 1.1 COMMUNICATION SKILLS – I

L T P

4 - 2

#### RATIONALE

Knowledge of English Language plays an important role in career development. This subject aims at introducing basic concepts of communication besides laying emphasis on developing listening, speaking, reading and writing skills as parts of Communication Skill.

#### LEARNING OUTCOMES

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

- Understand the importance of effective communication
- Describe the process of communication
- Communicate effectively in different contexts
- Identify parts of speech
- Write correct sentences using appropriate vocabulary
- Reproduce and match words and sentences in a paragraph
- Write various types of paragraphs, notices for different purposes and composition on picture with appropriate format
- Read unseen texts with comprehension

#### DETAILED CONTENTS

- |     |   |              |
|-----|---|--------------|
| 1   | Basics of Communication   | (13 periods) |
| 1.1 | Definition and process of communication   |              |
| 1.2 | Types of communication - formal and informal, oral and written, verbal and non-verbal |              |
| 1.3 | Communications barriers and how to overcome them                                      |              |
| 1.4 | Barriers to Communication, Tools of Communication                                     |              |

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2 Application of Grammar (18 periods)

2.1 Parts of Speech (Noun, verb, adjective, adverb) and modals

2.2 Sentences and its types

2.3 Tenses

2.4 Active and Passive Voice

2.5 Punctuation

2.6 Direct and Indirect Speech

3 Reading Skill (10 periods)

Unseen passage for comprehension (one word substitution, prefixes, suffixes, antonyms, synonyms etc. based upon the passage to be covered under this topic)

4 Writing Skill (15 periods)

4.1 Picture composition

4.2 Writing paragraph

4.3 Notice writing

## LIST OF PRACTICALS

**Note:** Teaching Learning Process should be focused on the use of the language in writing reports and making presentations.

Topics such as Effective listening, effective note taking, group discussions and regular presentations by the students need to be taught in a project oriented manner where the learning happens as a byproduct.

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## **Listening and Speaking Exercises**

1. Self and peer introduction
2. Newspaper reading
3. Just a minute session-Extempore
4. Greeting and starting a conversation
5. Leave taking
6. Thanking
7. Wishing well
8. Talking about likes and dislikes
9. Group Discussion
10. Listening Exercises.

## **INSTRUCTIONAL STRATEGY**

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

## **MEANS OF ASSESSMENT**

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

## **RECOMMENDED BOOKS**

1. Communicating Effectively in English, Book-I by Revathi Srinivas; Abhishek Publications, Chandigarh.
2. Communication Techniques and Skills by R. K. Chadha; DhanpatRai Publications, New Delhi.
3. High School English Grammar and Composition by Wren & Martin; S. Chand & Company Ltd., Delhi.
4. Excellent General English-R.B.Varshnay, R.K. Bansal, Mittal Book Depot, Malhotra Corrected and Approved by BTE, U.P., Lucknow in CDC Meeting held on 19.08.2023

5. The Functional aspects of Communication Skills – Dr. P. Prasad, S.K. Katria & Sons, New Delhi
6. Q. Skills for success – Level & Margaret Books, Oxford University Press.
7. e-books/e-tools/relevant software to be used as recommended by AICTE/UBTE/NITTTR.

**Websites for Reference:**

1. [http://www.mindtools.com/ page 8.html](http://www.mindtools.com/page 8.html) – 99k
2. <http://www.letstalk.com.in>
3. <http://www.englishlearning.com>
4. <http://learnenglish.britishcouncil.org/en/>
5. <http://swayam.gov.in>

**SUGGESTED DISTRIBUTION OF MARKS**

<b>Topic No.</b>	<b>Time Allotted (Periods)</b>	<b>Marks Allotted (%)</b>
1	13	24
2	18	32
3	10	16
4	15	28
<b>Total</b>	<b>56</b>	<b>100</b>

## 1.2 APPLIED MATHEMATICS - I

L T P

5 - -

### RATIONALE

Contents of this course provide fundamental base for understanding elementary mathematics and their uses in solving engineering problems. Contents of this course will enable students to use basic mathematical function like logarithms, partial fractions, matrices and basic 2D, curves in solving various engineering problems of all fields.

### LEARNING OUTCOMES

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

- Apply Binomial theorem to solve engineering problems
- Apply determinants properties and Cramer's rule to solve engineering problems
- Apply dot & cross product of vectors to find the solution of engineering problems
- Use complex numbers in various engineering problems
- Apply differential calculus and higher order to solve engineering problems
- Find velocity, acceleration, errors and approximation in engineering problems with application of derivatives.

### DETAILED CONTENTS

1. Algebra -I (12 Periods)
  - 1.1 Series : AP and GP; Sum, nth term, Mean
  - 1.2 Binomial theorem for positive, negative and fractional index (without proof).  
Application of Binomial theorem.
  - 1.3 Determinants : Elementary properties of determinant of order 2 and 3,  
Multiplication system of algebraic equation, Consistency of equation,  
Cramer's rule
2. Algebra- II (12 Periods)

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- 2.1 Vector algebra : Dot and Cross product, Scaler and vector triple product.
- 2.2 Complex number.  
Complex numbers, Representation, Modulus and amplitude Demoivre theorem, its application in solving algebraic equations, Mod. function and its properties..
  
- 3. Trigonometry (10 Periods)
  - 3.1 Relation between sides and angles of a triangle: Statement of various formulae showing relationship between sides and angle of a triangle.
  - 3.2 Inverse circular functions : Simple case only
  
- 4. Differential Calculus - I (18 Periods)
  - 4.1 Functions, limits, continuity, - functions and their graphs, range and domain, elementary methods of finding limits (right and left), elementary test for continuity and differentiability.
  - 4.2 Methods of finding derivative, Trigonometric functions, exponential function, Function of a function, Logarithmic differentiation, Differentiation of Inverse trigonometric function, Differentiation of implicit functions.
  
- 5. Differential Calculus - II (18 Periods)
  - 5.1 Higher order derivatives, Leibnitz theorem (without proof). Simple applications.
  - 5.2 Application - Finding Tangents, Normal, Points of Maxima/Minima, Increasing/Decreasing functions, Rate, Measure, velocity, Acceleration, Errors and approximation.

## **INSTRUCTIONAL STRATEGY**

The basic instructional strategy to teach basic mathematics, Binomial theorem, trigonometry, differential equations etc. should be conceptual with real world applications of relevant branch. More numerical and theory examples can be used for clear understanding of the content.

## MEANS OF ASSESSMENT

- Assignments and Quiz/Class Tests
- Mid-term and End-term Written Tests
- Model/Prototype Making

## RECOMMENDED BOOKS

1. Elementary Engineering Mathematics by BS Grewal, Khanna Publishers, New Delhi
2. Engineering Mathematics, Vol I & II by SS Sastry, Prentice Hall of India Pvt. Ltd.,
3. Applied Mathematics-I by Chauhan and Chauhan, Krishna Publications, Meerut.
4. Applied Mathematics-I (A) by Kailash Sinha and Varun Kumar; Aarti Publication, Meerut

## SUGGESTED DISTRIBUTION OF MARKS

<b>Topic</b>	<b>Time Allotted (Periods)</b>	<b>Marks Allotted (%)</b>
1.	12	20
2.	12	20
3.	10	12
4	18	24
5	18	24
<b>Total</b>	<b>70</b>	<b>100</b>



## 1.3 APPLIED PHYSICS – I

L T P

5 - 2

### RATIONALE

Applied physics includes the study of a diversified topics related to 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 behave. Concrete knowledge of physical laws, analysis and applications in various fields of engineering and technology are given prominence in this course content.

**Note: Teachers should give examples of engineering/technology applications of various concepts and principles in each topic so that students are able to learn and appreciate these concepts and principles. In all contents, SI units should be followed.**

### LEARNING OUTCOMES

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

- Identify the use of S.I. system of measurement with accuracy and how it is used in engineering
- Represent physical quantities as scalars and vectors, applying the physical laws and concepts of linear and circular motion in everyday life.
- Solve difficult problems (walking of man, horse and cart problem, flying of bird/ aircraft, etc.)
- Analyse and design banking of roads/railway tracks and apply conservation of momentum principle to Explain rocket propulsion, recoil of gun etc.
- Derive work, power and energy relationship and solve problems about work and power.
- Define work, energy and power and their units.
- Describe conservation of energy and its applications
- Understand the concept of rotational motion of a rigid body and its applications
- Apply the physical laws and concepts of gravity, its variation with longitude and latitude and its uses in space satellite etc.
- Understand the concept of elasticity, surface tension, pressure and the laws governing movement of fluids.

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- Express physical work in term of heat and temperature; Measure temperature in various processes on different scales (Celsius, Kelvin, Fahrenheit etc.)
- Distinguish between conduction, convection and radiation, identify the different methods for reducing heat losses
- Understand the laws of thermodynamics, Carnot cycle and their applications.

## **DETAILED CONTENTS**

1. Units and Dimensions (10 Periods)
  - 1.1 Need of Measurement in engineering and science, unit of a physical quantities - fundamental and derived units, systems of units (FPS, CGS and SI units)
  - 1.2 Dimensions and dimensional formulae of physical quantities.
  - 1.3 Principle of homogeneity of dimensions
  - 1.4 Dimensional equations and their applications, conversion of numerical values of physical quantities from one system of units into another, checking the correctness of physical equations and deriving relations among various physical quantities
  - 1.5 Limitations of dimensional analysis
  - 1.6 Error in measurement, accuracy and precision of instruments, random and systematic errors, absolute error, relative error, and percentage error, Estimation of probable errors in the results of measurement (combination of errors in addition, subtraction, multiplication, division and powers), rules for representing significant figures in calculation.
  - 1.7 Application of units and dimensions in measuring length, diameter, circumference, volume, surface area etc. of metallic and non metallic blocks, wires, pipes etc (at least two each).
  
2. Force and Motion (10 periods)
  - 2.1 Scalar and vector quantities – examples, representation of vector, types of vectors
  - 2.2 Addition and Subtraction of Vectors, Triangle and Parallelogram law (Statement only), Scalar and Vector Product.
  - 2.3 Resolution of Vectors and its application to lawn roller.
  - 2.4 Force, Momentum, Statement and Derivation of Conservation of linear momentum, its applications such as recoil of gun.
  - 2.5 Impulse and its Applications

- 2.6 Circular motion (Uniform and Non-uniform), definition of angular displacement, angular velocity, angular acceleration, frequency, time period.
- 2.7 Relation between linear and angular velocity, linear acceleration and angular acceleration (related numerical)
- 2.8 Central force, Expression and Applications of Centripetal and centrifugal forces with examples such as banking of roads and bending of cyclist, Principle of centrifuge.
- 2.9 Application of various forces in lifts, cranes, large steam engines and turbines

3. Work, Power and Energy (10 periods)

- 3.1 Work: and its units, examples of zero work, positive work and negative work, conservative and non-conservative force,
- 3.2 Friction: modern concept, types, laws of limiting friction, Coefficient of friction and its Engineering Applications.
- 3.3 Work done in moving an object on horizontal and inclined plane for rough and plane surfaces with its applications
- 3.4 Energy and its units: Kinetic energy and potential energy with examples and their derivation, work energy theorem.
- 3.5 Principle of conservation of mechanical energy for freely falling bodies, examples of transformation of energy.
- 3.6 Power and its units, calculation of power in numerical problems
- 3.7 Application of Friction in brake system of moving vehicles, bicycle, scooter, car trains etc.

4 Rotational Motion (10 periods)

- 4.1 Concept of translatory and rotatory motions with examples
- 4.2 Definition of torque with examples
- 4.3 Angular momentum, Conservation of angular momentum (quantitative) and its examples
- 4.4 Moment of inertia and its physical significance, radius of gyration for rigid body, Theorems of parallel and perpendicular axes (statements only), Moment

of inertia of rod, disc, ring and sphere (hollow and solid) (Formulae only).  
Concept of Fly wheel.

- 4.5 Rotational kinetic energy, Rolling of sphere on the slant plane,
- 4.6 Comparison of linear motion and rotational motion.
- 4.7 Application of rotational motions in transport vehicles, and machines.

5 Motion of planets and satellites (08 periods)

- 5.1 Gravitational force, Kepler's law of planetary motion,
- 5.2 Acceleration due gravity and its variation,
- 5.3 Gravitational Potential and Gravitational potential energy,
- 5.4 Motion of satellite, orbital velocity and time period of satellite, Total energy and Binding energy of a satellite, Escape energy and escape velocity,
- 5.5 Types of satellites, Geo-stationary satellite, semi-synchronous, polar satellite (concept only) and their uses in science and technology,
- 5.6 Concept of Black Holes

6. Properties of Matter (12 periods)

- 6.1 Elasticity: definition of stress and strain, different types of moduli of elasticity, Hooke's law, significance of stress strain curve
- 6.2 Pressure: definition, its units, atmospheric pressure, gauge pressure, absolute pressure, Fortin's Barometer and its applications
- 6.3 Surface tension: concept, its units, angle of contact, Capillary action and determination of surface tension from capillary rise method, applications of surface tension, effect of temperature and impurity on surface tension
- 6.4 Viscosity and coefficient of viscosity: Terminal velocity, Stoke's law and effect of temperature on viscosity, application in hydraulic systems.
- 6.5 Concept of fluid motion, stream line and turbulent flow, Reynold's number Equation of continuity, Bernoulli's Theorem and their applications.

7. Heat and Thermodynamics (10 periods)

- 7.1 Difference between heat and temperature
- 7.2 Modes of transfer of heat (Conduction, convection and radiation with examples)
- 7.3 Different scales of temperature and their relationship
- 7.4 Expansion of solids, liquids and gases, coefficient of linear, surface and cubical expansions and relation amongst them
- 7.5 Heat conduction in a metal rod, Temperature gradient, Concept of Co-efficient of thermal conductivity, Uses and effects of Heat conduction in Daily life.
- 7.6 Isothermal and Adiabatic process
- 7.7 Zeroth, First and second law of thermodynamics, Heat engine (concept Only), Carnot cycle.
- 7.8 Application of various systems of thermometry in refrigeration and air-conditioning etc.

## **LIST OF PRACTICALS (to perform minimum six experiments)**

- 1 To find radius of wire and its volume and the maximum permissible error in these quantities by using both vernier calipers and screw gauge.
- 2 To find the value of acceleration due to gravity on the surface of earth by using a simple pendulum.
- 3 To determine the Radius of curvature of (i) convex mirror, (ii) concave mirror by spherometer
- 4 To verify parallelogram law of forces
- 5 To study conservation of energy of a ball or cylinder rolling down an inclined plane.
- 6 To find the Moment of Inertia of a flywheel about its axis of rotation
- 7 To determine the atmospheric pressure at a place using Fortin's Barometer
- 8 To determine the viscosity of glycerin by Stoke's method
- 9 To determine the coefficient of linear expansion of a metal rod
- 10 To determine force constant of spring using Hooks law

## **INSTRUCTIONAL STATREGY**

Teacher may use various teaching aids like live models, charts, graphs and experimental kits etc. for imparting effective instructions in the subject. The teacher should explain about field applications before teaching the basics to develop proper understanding of the physical phenomenon. Use of demonstration and animations can make the subject interesting and may develop scientific temper in the students. Teacher must plan a tour of Science Park/planetarium available in nearby areas in order to enhance the interest in this course.

## **MEANS OF ASSEMENTS**

- Assignment & Quiz,
- Mid-Term and End-Term written test,
- Model Making,
- Actual Lab & Practical Work,
- Viva Voce

## RECOMMENDED BOOKS

- 1 Text Book of Physics for Class XI (Part-I, Part-II); N.C.E.R.T., Delhi
- 2 Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi
- 3 Comprehensive Practical Physics, Vol, I & II, JN Jaiswal, Laxmi Publications (P) Ltd., New Delhi
- 4 B.Sc.Practical Physics by C L Arora, S. Chand Publication..
- 5 Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi
- 6 Engineering Physics by DK Bhattacharya& Poonam Tandan; Oxford University Press, New Delhi
- 7 Modern Engineering Physics by SL Gupta, Sanjeev Gupta, Dhanpat Rai Publications
- 8 V. Rajendran,physics-I, Tata McGraw-Hill raw Hill publication, New Delhi
- 9 Arthur Beiser, Applied Physics, Tata McGraw-Hill raw Hill publication, New Delhi
- 10 Physics Volume 1, 5<sup>th</sup> edition, Haliday Resnick and Krane, Wiley publication

## TOPIC WISE DISTRIBUTION OF PERIODS AND MARKS

<b>Topic No.</b>	<b>Time Allotted (Periods)</b>	<b>Marks Allotted (%)</b>
1	10	15
2	10	15
3	10	15
4	10	15
5	08	10
6	12	16
7	10	14
<b>Total</b>	<b>70</b>	<b>100</b>

## 1.4 GENERAL MECHANICAL ENGINEERING

L T P  
6 - 4

### RATIONALE

For every practicing engineer some knowledge of Mechanical Engineering relevant to his discipline is a must. This paper is meant to provide the would be textile technologists elements of mechanical engineering relevant to their work. Topic Wise Distribution of Periods

### DETAILED CONTENTS

#### 1. FOUNDATIONS AND INSTALLATIONS:

General principles and considerations for machine foundations, vibrations in machine foundations. Layout of foundation bolts, alignment of machines care and precautions to be used in installation of machines, introduction to Indian Standards on machine foundations. Practice in blueprint reading for installations.

#### 2. PIPE AND PIPE FITTINGS:

Classification of pipes according to materials used, field of application, IS specifications of water, air and steam pipes, various types of pipe fittings and their applications, laying of pipes, cuttings threading and jointing of pipes.

#### 3. BEARINGS AND LUBRICATION:

Various kinds of bearings, bush bearing, ball and roller bearing, thrust bearing and their application in textile machineries. Principle of film lubrication. Various methods of lubrication, lubricants and their properties. Selection of lubricants for various textile machineries.

#### 4. POWER TRANSMISSION & MATERIAL HANDLING:

- (a) Different types of Trolleys used in process house.
- (b) Belt and gear drive.

Types of gears, spur gear, bevel gear, helical gear, worm and worm wheel, rack and pinion.

Power transmission by belt, chain and gears. Gear drive, application of various kinds of gears and drives in textile machinery. Variable speed drives.



## **5. COUPLINGS, CLUTCHES, ECCENTRICS AND CAMS:**

Necessity of coupling, types of couplings, rigid and flexible couplings, universal coupling, fluid coupling. Introduction to common types of clutches, eccentrics and cams, their function and use.

## **6. FUELS AND COMBUSTION :**

Common solid, liquid and gas fuels. Their composition, higher and lower calorific values. Calculation of air required for complete combustion of unit mass/volume. Concept of excess air in boiler furnace combustion. Heat carried away by flue gases. Flue gas analysis by Orsat apparatus.

(Simple Numerical Problems)

Idea of specific properties of liquid fuels such as knock resistance (Cetane and Octane numbers). Flash point, Flame point, Solidification point.

## **7. THERMODYNAMICS:**

Concept of thermodynamic systems and surroundings, Work and its relation to heat. First law of thermodynamics and its application to Constant volume, Constant pressure, Constant temperature and adiabatic processes in dealing with gases and vapors. Representation of these processes in P. V. diagram, calculation of work done. Second law of thermodynamics. Concept of enthalpy, entropy of thermodynamic system. Concept of Heat engine, Heat pump and refrigerator. Carnot cycle efficiency of heat engine, coefficient of performance of refrigerator and heat pump Steady state flow process. Its equation and application.

## **8. STEAM GENERATION AND STEAM GENERATORS:**

Idea of steam generation from water at 0°C. Pressure and temperature curve of steam generation. Idea of wet, dry saturated and super-heated steam. Saturation pressure, temperature, degree of super heat, Enthalpy, Entropy and specific volume of wet, dry saturated and super-heated steam. Use of steam tables for simple calculations. Introduction to water tube, fire tube boilers e. g. Lancashire, Babcock Wilcox's, Cochran and Simple vertical boilers. Boilers mountings and accessories. Steam traps, Reducers, Expansion bends. Boilers specification. Equivalent evaporation, Boiler efficiency, Draught, Chimney height, Conditions for maximum draught through chimney. Measurement of steam consumption. Simple numerical problems.

## **9. PUMPS & AIR COMPRESSORS:**

Elementary knowledge of working of reciprocating, Centrifugal and Vacuum pumps, Blowers and Compressors, Fans and Exhausts Difference between reciprocating and rotary compressors. Their types and working, Single stage and Multi stage compressors. Power required to drive single stage compressor. Volumetric efficiency and effect of temperature on it. Use of compressed air in textile industry.

## **10. REFRIGERATION AND AIR CONDITIONING:**

Meaning of the term refrigeration. Its application, Unit. Refrigeration methods. Bellcoleman air cycle, air refrigerator, Vapor compression refrigeration. Analysis of simple saturated cycle for vapor compression refrigerator.

Characteristics of good refrigerants. Properties of common refrigerants such as NH<sub>3</sub>, Co<sub>2</sub>, So<sub>2</sub> Fe-12.

Air Conditioning:

Meaning of the term and its application. Gas and vapor mixture. Dry and wet bulb temperature, Dew-point, Depression of wet bulb temperature and Depression of Dew-point. Saturated air, specific humidity, relative humidity, Absolute humidity. Humid specific volume, Heat enthalpy of moist air. Use of psychometric charts and tables. Sensible heating and cooling. Humadification. Dehumadification and their methods.

Air conditioning for human comfort. Air conditioning, for summer and winter. Air conditioning round the year, Psychometric air conditioning. Industrial air conditioning.

## GENERAL MECHANICAL ENGINEERING-LAB

A. Demonstration of the following for study and sketch.

1. (a) Bio Gas Plant.  
(b) Wind Mill.  
(c) Solar Cooker.  
(d) Voltaic Cell Type Solar Energy Converter.
2. Key's, Key ways and Splined shaft e.g. Jib head key, Flat key, Saddle key, Woodruff key, Feather key, Pin key, Splined shaft.
3. Pins- Split pin, Taper cotter type split pin, Cottorpin, Cottor bolts. Foundations Bolts- Lewis rag bolt, Fish tail bolt and Square head bolt.
4. Friction clutch and Coupling- Cone cluch, Plate cluch (Single Pair); Muffcoupling, Flange coupling, Universal or Hook's joint coupling. Flexible coupling- Belt and Pin Type, Coil spring type.
5. Bearings- Plane, Bush, Split step bearings, Ball Roller bearings, Thrust bearings.
6. Gears- Spur gear, Single and Double herical gears, Bevel gears.
7. Gear Trains- Simple spur gear train, Compound gear train, Epicyclic gear train.
8. Compressor and Tension helical springs.
9. Slider Crank Mechanism and Quick Return Mechanism.

Performance Practical's:

10. Determination of velocity ratio of a spur gear train.
11. Velocity diagram of a four bar chain mechanism.
12. Performance evaluation of solar cooker.

### NOTE:-

Field visits are recommended for equipment's not available in the institution such as biogas plant, wind mill, Boilers. No need to purchase them. Models of Boilers may be procured for study purpose.

### SUGGESTED DISTRIBUTION OF MARKS

<b>Topic No.</b>	<b>Time Allotted (Periods)</b>	<b>Marks Allotted (%)</b>
1	8	10
2	8	10
3	8	10
4	8	8
5	8	10
6	8	10
7	8	10
8	10	12
9	8	8
10	10	12
<b>Total</b>	<b>84</b>	<b>100</b>

## 1.5 ENGINEERING DRAWING

L T P

- - 10

### RATIONALE

Drawing is the language of engineers and technicians. Reading and interpreting engineering drawing is their day to day responsibility. The subject is aimed at developing basic graphic skills in the students so as to enable them to use these skills in preparation of engineering drawings, their reading and interpretation. The emphasis, while imparting instructions, should be to develop conceptual skills in the students following BIS SP 46 – 1988.

#### Note:

- i) First angle projection is to be followed
- ii) Minimum of 25 sheets to be prepared and atleast 2 sheets on AutoCAD
- iii) Instructions relevant to various drawings may be given along with appropriate demonstrations, before assigning drawing practice to students

### LEARNING OUTCOMES

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

- Identify and use of different grades of pencils and other drafting instruments which are used in engineering field
- Draw free hand sketches of various kinds of objects.
- Utilize various types of lines used in engineering drawing.
- Read and apply different dimensioning methods on drawing of objects.
- Use different types of scales and their utilization in reading and reproducing drawings of objects and maps.
- Draw 2 - dimensional view of different objects viewed from different angles (orthographic views)
- Draw and interpret complete inner hidden details of an object which are otherwise not visible in normal view

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- To make projections of Solid
- Generate isometric (3D) drawing from different 2D (orthographic) views/sketches
- Identify conventions for different engineering materials, symbols, sections of regular objects and general fittings used in Civil and Electrical household appliances
- Draw the different type of Machine Drawing
- Use basic commands of AutoCAD.

## **DETAILED CONTENTS**

1. Introduction to Engineering Drawing (03 sheets)
  - 1.1 Introduction to drawing instruments, materials, different types of lines in Engineering drawings as per BIS Specifications .
  - 1.2 Practice of vertical, horizontal and inclined lines, triangles, rectangles, circles, hexagonal, pentagon with the help of drawing instruments.
  - 1.3 Free hand and instrumental lettering (Alphabet and numerals) , (Capital Letter), vertical and inclined at 75 degree.
  
2. Dimensioning Technique (01 sheet)
  - 2.1 Necessity of dimensioning, method and principles of dimensioning (mainly theoretical instructions)
  - 2.2 Dimensioning of overall sizes, circles, threaded holes, chamfered surfaces, angles, tapered surfaces, holes, equally spaced on P.C.D., counter sunk holes, counter bored holes, cylindrical parts, narrow spaces and gaps, radii, curves and arches
  
3. Scales (02 sheets)
  - 3.1 Scales –their needs and importance (theoretical instructions), type of scales, definition of R.F. and length of scale

3.2 Drawing of plain and diagonal scales

4. Orthographic Projections (06 sheets)

4.1 Theory of orthographic projections (Elaborate theoretical instructions)

4.2 Projection of Points in different quadrant

4.3 Projection of Straight Line (1<sup>st</sup> and 3<sup>rd</sup> angle)

4.3.1. Line parallel to both the planes

4.3.2. Line perpendicular to any one of the reference plane

4.3.3. Line inclined to any one of the reference plane.

4.4 Projection of Plane – Different lamina like square, rectangular, triangular and circle inclined to one plane, parallel and perpendicular to another plane in 1<sup>st</sup> angle only

4.5 Three views of orthographic projection of different objects. (At least one sheet in 3<sup>rd</sup> angle)

4.6 Identification of surfaces

5 Projection of Solid (01 sheets)

5.1. Definition and salient features of Solid

5.2. To make projections, sources, Top view, Front view and Side view of various types of Solid .

6. Sections (02 sheets)

6.1 Importance and salient features

- 6.2 Drawing of full section, half section, partial or broken out sections, Offset sections, revolved sections and removed sections.
  - 6.3 Convention sectional representation of various materials, conventional breaks for shafts, pipes, rectangular, square, angle, channel, rolled sections
  - 6.4 Orthographic sectional views of different objects.
7. Isometric Views (02 sheets)
- 7.1 Fundamentals of isometric projections and isometric scale.
  - 7.2 Isometric views of combination of regular solids like cylinder, cone, cube and prism.
8. Common Symbols and Conventions used in Engineering (02 sheets)
- 8.1 Civil & Electrical fitting symbols .
9. Introduction to Machine Drawing (08 Sheets)
- 9.1 Draw the assembly from part details of objects
  - 9.2 Identify and draw different types of screw threads used in various machines and assemblies as per domestic and international standards
  - 9.3 Draw different types of nuts, bolts and washers
  - 9.4 Draw various locking devices and foundation bolts
  - 9.5 Draw different section of various types of keys and cotter joints
  - 9.6 Draw various riveted joints
  - 9.7 AutoCAD

**\* Auto CAD drawing will be evaluated internally by sessional marks and not by final theory paper.**

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## **INSTRUCTIONAL STRATEGY**

Teacher should show model of realia of the component/part whose drawing is to be made. Emphasis should be given on cleanliness, dimensioning and layout of sheet. Focus should be on proper selection of drawing instruments and their proper use. The institute should procure Auto CAD or other engineering graphics software for practice in engineering drawings. Teachers should undergo training in AutoCAD/Engineering Graphic. Separate labs for practice on AutoCAD should be established.

## **MEANS OF ASSESSMENT**

Sketches  
Drawing  
Use of software

## **RECOMMENDED BOOKS**

1. A Text Book of Engineering Drawing by Surjit Singh; Dhanpat Rai & Co., Delhi
2. Engineering Drawing by PS Gill; SK Kataria & Sons, New Delhi
3. Elementary Engineering Drawing in First Angle Projection by ND Bhatt; Charotar Publishing House Pvt. Ltd., Anand
4. Engineering Drawing I & II by JS Layall; Eagle Parkashan, Jalandhar
5. Engineering Drawing I by DK Goel, GBD Publication.

## 1.6 TEXTILE FIBRE-I

L T P

4 - 4

### Learning Outcomes:

After completing the course student will be able to:

- Able to understand the desirable properties of textile fibres, textile fibre classification.
- Able to understand the cultivation of cotton, different cotton varieties, morphological structure of cotton, jute & other natural fibres
- Be able to understand the important properties of wool fibres, their structure & their uses
- Be able to understand & explain the properties of silk fibres, its structure & uses

1.7.1 Introduction: various definitions related to textile fibres, classification of textile fibres, difference between staple & filament, essential & desirable properties of textile fibres, advantages & disadvantages of natural fibres.

1.7.2 Cotton cultivation and harvesting, development of cotton fibres in seed, cotton varieties and grading, morphological structure, physical and chemical properties of cotton fibre and its applications.

1.7.3 Jute cultivation, retting and extraction process, structure of jute fibre, physical and chemical properties of jute fibre and its applications, Introduction to other natural bast fibres like flax, hemp, ramie, banana and leaf fibres etc. and their applications.

1.7.4 Types of wool and its grading, Morphological structure, chemical composition, physical & chemical properties, varieties of wool fibres and their applications, introduction to other animal fibres like angora fibres, camel hair fibre, goat fibre etc. and their applications.

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- 1.7.5 Types of silk and its production, chemical composition and morphological structure of silk, physical & chemical properties of silk and its applications.

Recommended Books -

1. वस्त्र रेशे –उत्पादन विशेषताएँ एवं उपयोग –DR. D.B. Shakyawar& Dr. M.K. Singh , abhishek Publication Chandigarh/ New Delhi.
2. TextileFibrebyGhol and Valanslk`
3. S. P. Mishra, A text book of Fibres Science and technology, New Age International (p) Ltd 2000.
4. H V S Murthy, Textile Fibres- Textile Association Publication 1995.
5. Textile Fibres –I By Dr. V.A. Shenai

## **TEXTILE FIBRE-I**

### **List of Experiments**

1. To distinguish animal fibres from vegetable fibres.
  - (i) With an alkali
  - (ii) With an acid
2. To distinguish
  - (i) Linen from cotton
  - (ii) Silk from wool fibres
3. To identify textile fibres such as cotton, wool, silk, jute under microscope and to draw their longitudinal and cross-sectional views.
4. Checking moisture regain of different natural textile fibres by shirley moisture meter and by good brand conditioning oven.
5. To check the maturity ratio of cotton fibres by 10% caustic soda solution.
6. To identify natural textile fibres by
  - (i) Staining test
  - (ii) Solubility test
  - (iii) Burning test

## Second Semester

### 2.1 APPLIED MATHEMATICS - II

**L T P**

**5 - -**

#### RATIONALE

Basic elements of integral calculus, differential calculus, numerical methods, differential equations included in this course will play a vital role in understanding engineering problem mathematically. This will also develop analytical as well as conceptual abilities among students.

#### LEARNING OUTCOMES

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

- Calculate simple integration by methods of integration
- Evaluate the area under curves, surface by using definite integrals.
- Calculate the area and volume under a curve along areas
- Solve the engineering problems with numerical methods.
- Understand the geometric shapes used in engineering problems by co-ordinate geometry.

#### DETAILED CONTENTS

#### 1. Integral Calculus - I (20 Periods)

Methods of Indefinite Integration :-

- 1.1 Integration by substitution.
- 1.2 Integration by rational function.
- 1.3 Integration by partial fraction.
- 1.4 Integration by parts.
- 1.5 Integration of special function

#### 2. Integral Calculus - II: (20 Periods)

- 2.1 Meaning and properties of definite integrals, Evaluation of definite integrals..

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- 2.2 Application : Length of simple curves, Finding areas bounded by simple curves Volume of solids of revolution, centre of mean of plane areas.
- 2.3 Simposns 1/3rd and Simposns 3/8th rule and Trapezoidal Rule : their application in simple cases. Numerical solutions of algebraic equations; Bisections method, Regula-Falsi method, Newton-Raphson's method(without proof), Numerical solutions of simultaneous equations; Gauss elimination method(without proof)
3. Co-ordinate Geometry (2 Dimension) (18 Periods)
- 3.1 Circle  
Equation of circle in standard form. Centre - Radius form, Diameter form, Two intercept form.
4. Co-ordinate Geometry (3 Dimension) (12 Periods)
- 4.1 Straight lines and planes in space  
Distance between two points in space, direction cosine and direction ratios, Finding equation of a straight line (without proof)

### **INSTRUCTIONAL STRATEGY**

Basic elements of Differential Calculus, Integral Calculus and differential equations can be taught conceptually along with real engineering applications in which particular algorithm and theory can be applied. Numerical examples will be helpful in understanding the content of the subject.

### **MEANS OF ASSESSMENT**

- Assignments and Quiz/Class Tests
- Mid-term and End-term Written Tests
- Model/Prototype Making

### **RECOMMENDED BOOKS**

1. Elementary Engineering Mathematics by BS Grewal, Khanna Publishers, New Delhi
2. Engineering Mathematics, Vol I & II by SS Sastry, Prentice Hall of India Pvt. Ltd.,

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- 3 Applied Mathematics-II by Chauhan and Chauhan, Krishna Publications, Meerut.
4. Applied Mathematics-I (B) by Kailash Sinha and Varun Kumar; Aarti Publication, Meerut

**SUGGESTED DISTRIBUTION OF MARKS**

<b>Topic</b>	<b>Time Allotted (Periods)</b>	<b>Marks Allotted (%)</b>
1.	20	28
2.	20	28
3.	18	24
4	12	20
<b>Total</b>	<b>70</b>	<b>100</b>

## 2.2 APPLIED PHYSICS – II

L T P

5 - 2

### RATIONALE

Applied physics includes the study of a diversified topics related to 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 behave. Concrete knowledge of physical laws, analysis and applications in various fields of engineering and technology are given prominence in this course content.

**Note: Teachers should give examples of engineering/technology applications of various concepts and principles in each topic so that students are able to learn and appreciate these concepts and principles. In all contents, SI units should be followed.**

### LEARNING OUTCOMES

After undergoing this subject, the student will be able to;

- Define wave motion its types (Transverse and Longitudinal), Periodic and Simple Harmonic Motion, solve simple problems.
- Define the terms: frequency, amplitude, wavelength, velocity of a wave.
- Explain various Engineering, Medical and Industrial applications of Ultrasonics.
- Apply acoustics principles to various types of buildings to get best sound effect
- Explain diffraction, interference, polarization.
- Define capacitance and its unit. They will be able to explain the function of capacitors in simple circuits, solve simple problems using  $C=Q/V$
- Explain the role of free electrons in insulators, conductors and semiconductors, qualitatively the terms: potential, potential difference, electromotive force.
- Explain the concept of electric current, resistance and its measurement.
- List the effects of an electric current and their common applications, State and apply Ohm's law, calculate the equivalent resistance of a variety of resistor combinations, determine the energy consumed by an appliance, distinguish between AC and DC electricity
- Explain Biot-Savart Law, Ampere's law, Lorenz Force.
- State the laws of electromagnetic induction, describe the effect on a current-carrying conductor when placed in a magnetic field
- Explain operation of moving coil galvanometer, simple DC motor



- Apply the knowledge of diodes in rectifiers, adapters IC's and various electronic circuits. Apply the concept of light amplification in designing of various LASER based instruments and optical sources.
- Explain total internal reflection and apply this concept for optical fibre and its uses in Medical field and Communication.

## DETAILED CONTENTS

1. Wave motion and its applications (12 periods)
  - 1.1 Wave motion, transverse and longitudinal wave motion with examples, sound and light waves, relationship among wave velocity, frequency and wave length and its application
  - 1.2 Wave equation  $y = r \sin wt$ , phase, phase difference, principle of superposition of waves
  - 1.3 Simple Harmonic Motion (SHM): definition and characteristic, expression for displacement, velocity, acceleration, time period, frequency in S.H.M., Energy of a body executing S. H. M., simple pendulum, concept of simple harmonic progressive wave,
  - 1.4 Free, Damped and forced oscillations, Resonance with examples, Q-factor
  - 1.5 Definition of pitch, loudness, quality and intensity of sound waves, intensity level, Echo and reverberation, Sabine formula for reverberation time(without derivation), coefficient of absorption of sound, methods to control reverberation time and their applications, Acoustics of building defects and remedy.
  - 1.6 Ultrasonics –production, detection, properties and applications in engineering and medical applications.
  
2. Wave Optics (6 periods)
  - 2.1 Dual nature of light, wave theory of light, laws of reflection and refraction, Snell's law, Power of lens, magnification.
  - 2.2 Two-Source Interference, Double-Slit interference, Interference due to thin films, Fresnel's biprism.
  - 2.3 use of interference making highly efficient solar panel.
  - 2.4 diffraction, Single Slit diffraction, Intensity calculation etc.
  - 2.5 Polarization of electromagnetic waves, polarizing sheets, polarizing by Reflection (Brewer's law), Malus law, use of Polaroids.

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3. Electrostatics (12 periods)

- 3.1 Concept of charge, Coulombs law, Electric field of point charges, Electric lines of force and their properties, Electric flux, Electric potential and potential difference.
- 3.2 Gauss law of electrostatics: Application of Gauss law to find electric field intensity of straight charged conductor, plane charged sheet and charged sphere.
- 3.3 Capacitor and its working principle, Capacitance and its units. Capacitance of parallel plate capacitor. Series and parallel combination of capacitors (numerical), charging and discharging of a capacitor.
- 3.4 Dielectric and its effect on capacitance, dielectric break down.
- 3.5 Application of electrostatics in electrostatic precipitation of microbes and moisture separation from air and gases in industry for pollution control (Brief explanation only)

4. Current Electricity (12 periods)

- 4.1 Electric Current, Resistance, Specific Resistance, Conductance, Specific Conductance, Series and Parallel combination of Resistances. Factors affecting Resistance, Colour coding of carbon Resistances, Ohm's law. Superconductivity.
- 4.2 Kirchhoff's laws, Wheatstone bridge and its applications (meter bridge and slide wire bridge)
- 4.3 Concept of terminal potential difference and Electro motive force (EMF), potentiometer.
- 4.4 Heating effect of current, Electric power, Electric energy and its units (related numerical problems), Advantages of Electric Energy over other forms of energy
- 4.5 Examples of application of DC circuits in various electrical and electronics equipment such as C.R.O, T.V., Audio-Video System, Computers etc.

5. Magneto Statics and Electromagnetism (12 periods)

- 5.1 Magnetic poles, force on a moving charge, circulating charges, force on a current carrying wire, Hall effect, torque on a current loop.
  - 5.2 Magnetic field due to moving charge(Biot-Savart Law), due to current (Biot-Savart Law), parallel currents, field of a solenoid, Ampere's law.
  - 5.3 Faraday's law, Lenz' law, motional emf, induced electric fields.
  - 5.4 Magnetic dipole and force on a magnetic dipole in a non-uniform field, Magnetization, Gauss' law for magnetism.
  - 5.5 Types of magnetic materials. Dia, para and ferromagnetic materials with their properties,
  - 5.6 Application of electromagnetism in ac/dc motors and generators.
6. Semiconductor physics (8 periods)
- 6.1 Types of materials (insulator, semiconductor, conductor), intrinsic and extrinsic semiconductors, p-n junction diode and its V-I characteristics
  - 6.2 Diode as rectifier – half wave and full wave rectifier (centre taped),
  - 6.3 Semiconductor transistor, pnp and npn (concepts only)
  - 6.4 Application of semiconductor diodes (Zener, LED) and that of transistor as amplifier and oscillator.
7. Modern Physics (8 Periods)
- 7.1 Lasers: concept of energy levels, ionizations and excitation potentials; spontaneous and stimulated emission; laser and its characteristics, population inversion, Types of lasers; Ruby and He-Ne lasers, engineering and medical applications of lasers.
  - 7.2 Fibre optics: Total internal reflection and its applications, Critical angle and conditions for total internal reflection, introduction to optical fibers, light propagation, types, acceptance angle and numerical aperture, types and applications of optical fibre in communication.
  - 7.3 Introduction to nanotechnology, nanoparticles and nano materials,

**LIST OF PRACTICALS** (To perform minimum six experiments)

1. To determine the velocity of sound with the help of resonance tube.
2. To find the focal length of convex lens by displacement method.
3. To find the refractive index of the material of given prism using spectrometer.
4. To find the wavelength of sodium light using Fresnel's biprism.
5. To verify laws of resistances in series and parallel combination
6. To verify ohm's laws by drawing a graph between voltage and current.
7. To measure very low resistance and very high resistances using Slide Wire bridge
8. Conversion of Galvanometer into an Ammeter and Voltmeter of given range.
9. To draw hysteresis curve of a ferromagnetic material.
10. To draw characteristics of a pn junction diode and determine knee and break down voltages.
11. To find wave length of the laser beam.
12. To find numerical aperture of an optical fiber.

## **INSTRUCTIONAL STATREGY**

Teacher may use various teaching aids like live models, charts, graphs and experimental kits etc. for imparting effective instructions in the subject. The teacher should explain about field applications before teaching the basics to develop proper understanding of the physical phenomenon. Use of demonstration and animations can make the subject interesting and may develop scientific temper in the students. Teacher must plan a tour of Science Park/planetarium available in nearby areas in order to enhance the interest in this course.

## **MEANS OF ASSESSMENT**

- Assignment & Quiz,
- Mid-Term and End-Term written test,
- Model Making,
- Actual Lab & Practical Work,
- Viva-Voice

## **RECOMMENDED BOOKS**

1. Text Book of Physics (Part-I, Part-II); N.C.E.R.T., Delhi
2. Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi
3. A Text Book of Optics, Subramanian and Brij Lal, S Chand & Co., New Delhi
4. Practical Physics, by C. L. Arora, S Chand publications
5. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi

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6. Modern Engineering Physics by SL Gupta, Sanjeev Gupta, Dhanpat Rai Publications.
7. Physics Volume 2, 5<sup>th</sup> edition, Haliday Resnick and Krane, Wiley publication
8. Fundamentals of Physics by Haliday, Resnick & Walker 7<sup>th</sup> edition, Wiley publication

**SUGGESTED DISTRIBUTION OF MARKS**

<b>Topic No.</b>	<b>Time Allotted (Periods)</b>	<b>Marks Allotted (%)</b>
1	12	18
2	6	8
3	12	18
4	12	16
5	12	16
6	8	12
7	8	12
<b>Total</b>	<b>70</b>	<b>100</b>

## 2.3 APPLIED CHEMISTRY

L T P

5 - 2

### RATIONALE

The use of various chemicals and chemical products in diverse technical and engineering fields have repeatedly proved the importance of Applied Chemistry, which enhances its role to a new peak. On the other hand, ever increasing use of such materials will compel engineers, technocrats to acquire essential applied chemistry knowledge in order to select engineering materials, which not only suit them but also provide more environmental compatibility. This situation demands principles of Applied Chemistry in diploma-engineering courses. Principles of Applied Chemistry will enable budding engineers and technocrats to develop scientific temper and appreciate physical, chemical and engineering properties of materials. Hence the subject of Applied Chemistry.

### LEARNING OUTCOMES

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

- Classify various substances based on state of aggregation
- Substantiate the laws and principles on which structure of atom is established.
- Explain and predict properties of substances.
- Explain sources of water and various characteristics of water (quantitatively).
- Explain cause and factors which can adversely affecting natural water quality and remedial measures available for water purification
- Think critically, develop and adapt water conservation techniques.
- Explain corrosion of metal and their preventive measures.
- explain chemical nature and causes of corrosion
- apply correct and efficient methods of corrosion prevention.
- explain chemistry of fuels and their relative advantages.
- select most efficient fuel for the engine and engineering applications.
- suggest how to subside air pollution caused by the use of fossil fuels
- explain the chemistry of various polymers and plastics

- verify suitability and select polymer/rubber/plastic materials for engineering applications.

## DETAILED CONTENTS

1. Atomic Structure, Periodic Table and Chemical Bonding (14 periods)
  - 1.1 Fundamental particles- mass and charges of electrons, protons and neutrons with names of the scientists who discovered these fundamental particles.
  - 1.2 Bohr's model of atom and successes and limitations of atomic theory (qualitative treatment only).
  - 1.3 Atomic number, atomic mass number isotopes and isobars.
  - 1.4 Definition of orbit and orbitals, shapes of s and p orbitals only, quantum numbers and their significance,
  - 1.5 Aufbau's principle, Pauli's exclusion principle and Hund's rule electronic configuration of elements with atomic number (Z) = 30 only. (Electronic configurations of elements with atomic number greater than 30 are excluded).
  - 1.6 Modern periodic law and periodic table, groups and periods, classification of elements into s, p, d and f blocks (periodicity in properties - excluded)
  - 1.7 Chemical bonding and cause of bonding and types such as ionic bond in NaCl sigma ( $\sigma$ ) and pi ( $\pi$ ) covalent bonds in H<sub>2</sub>, HCl, Cl<sub>2</sub>, elementary idea of hybridization in BeCl<sub>2</sub>, BF<sub>3</sub>, CH<sub>4</sub>, NH<sub>3</sub> and H<sub>2</sub>O, VSEPR, Molecular orbital Theory
  - 1.8 States of Matter: Solid, Liquid & Gas, Metallic bonding- explanation with the help of electron gas (sea) model.
  
2. Fuels and Lubricants (18 periods)
  - 2.1 Definition of fuel, classification of fuels, characteristics of good fuel, relative merits of gaseous, liquid and solid fuels
  - 2.2 Calorific value-higher calorific value, lower calorific value, determination of calorific value of solid or liquid fuel using Bomb calorimeter and numerical examples.

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- 2.3 Coal - types of coal and proximate analysis of coal
- 2.4 Fuel rating – Octane number and Cetane number, fuel-structural influence on Octane and Cetane numbers
- 2.5 Gaseous fuels – chemical composition, calorific value and applications of natural gas (CNG), LPG, producer gas, water gas and biogas.
- 2.6 Elementary ideal on – hydrogen as future fuels, nuclear fuels.
- 2.7 Lubricants: Definition and properties, mechanism, industrial application and its function in bearings.
- 2.8 Synthetic lubricants and cutting fluids.

3. Water (14 periods)

- 3.1 Demonstration of water resources on Earth using pie chart.
- 3.2 Classification of water – soft water and hard water, action of soap on hard water, types of hardness, causes of hardness, units of hardness – mg per liter ( $\text{mgL}^{-1}$ ) and part per million (ppm) and simple numerical, pH and buffer solutions and their applications.
- 3.3 Disadvantages caused by the use of hard water in domestic and boiler feed water. Priming and foaming and caustic embrittlement in boilers.
- 3.4 Removal of hardness -Permutit process and Ion-exchange process.
- 3.5 Physico-Chemical methods for Water Quality Testing
  - a) Determination of pH using pH meter, total dissolved solids (TDS)
  - b) Testing and Estimation of- alkalinity, indicator their types and application total hardness by EDTA method and O'Hener's Method. (chemical reaction of EDTA method are excluded).
  - c) Understanding of Indian Water Quality standards as per WHO
- 3.6 Natural water sterilization by chlorine and UV radiation and reverse osmosis.
- 3.7 Municipality waste water treatment. Definition of B.O.D and C.O.D.



4. Electrochemistry (4 periods)

Redox Reaction, Electrode Potential, Nernst equation, Electrochemical cell (Galvanic and Electrolytic); Nernst equation.

5. Corrosion and its Control (10 periods)

5.1 Definition of corrosion and factors affecting corrosion rate.

5.2 Theories of

a) Dry (chemical) corrosion- Pilling Bedworth rule

b) Wet corrosion in acidic atmosphere by hydrogen evolution mechanism

5.3 Definition of passivity and galvanic series

5.4 Corrosion control:

$\alpha$ ) Metal coatings – Cathodic protection, Cementation on Base Metal Steel –Application of Metal Zn (Sheradizing),Cr (Chromozing) and Al (Calorizing), Sacrificial protection and impressed current voltage

$\beta$ ) Inorganic coatings – Anodizing and phosphating,

$\chi$ ) Organic coatings - use of paints varnishes and enamels

$\delta$ ) Internal corrosion preventive measures- alloying (with reference to passivating, neutralizing and inhibition) and heat treatment (quenching, annealing)

6. Organic compounds, Polymers and Plastics (10 periods)

6.1 Classification of organic compounds and IUPAC Nomenclature

6.2 Definition of polymer, monomer and degree of polymerization

6.3 Brief introduction to addition and condensation polymers with suitable examples (PE, PS, PVC, Teflon, Nylon -66 and Bakelite)

6.4 Definition of plastics, thermo plastics and thermo setting plastics with suitable examples, distinctions between thermo and thermo setting plastics

## 6.5 Applications of polymers in industry and daily life

### **LIST OF PRACTICALS**

1. Estimation of total hardness of water using standard EDTA solution
2. Estimation of total alkalinity of given water sample by titrating it against standard sulfuric acid solution
3. Proximate analysis of solid fuel)
4. Estimation of temporary hardness of water sample by O' Hener's Method.
5. Determination of flash and fire point of given lubricating oil using Able's flash point apparatus

### **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.

### **MEANS OF ASSEMENTS**

- Assignment & Quiz,
- Mid-Term and End-Term written test,
- Model Making,
- Actual Lab & Practical Work,
- Viva Voce

### **RECOMMENDED BOOKS**

1. Chemistry in Engineering by J.C. Kuricose & J. Rajaram, Tata McGraw Hill, Publishing Company Limited, New Delhi.

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2. Engineering Chemistry by P.C. Jain & Monika Jain, Dhanapat Rai Publishing Company, New Delhi.
3. Eagle's Applied Chemistry - I by S. C. Ahuja & G. H. Hugar, Eagle Prakashan, Jalandhar.
4. Engineering Chemistry – A Text Book by H. K. Chopra & A. Parmar, Narosa Publishing House, New Delhi.
5. Applied Chemistry - I by Dr. P. K Vij & Shiksha Vij, Lords Publications, Jalandhar.
6. Engineering Chemistry by Dr. Himanshu Pandey, Goel Publishing House, Meerut, India

### SUGGESTED DISTRIBUTION OF MARKS

Topics	Time Allotted (hrs)	Marks Allotted (%)
1	14	20
2	18	24
3	14	20
4	4	6
5	10	15
6	10	15
<b>Total</b>	<b>70</b>	<b>100</b>

## 2.4 TEXTILE FIBRES-II

(Common with Textile Technology and Textile Chemistry)

L T P  
4 - 2

### RATIONALE

Textile Fibre being the primary input to textile industry, any education in the field of textiles remains incomplete with some knowledge of textile fibres, so whether it is textile technologist or textile chemist knowledge of textile fibres is inevitable. The paper aims to expose the vital aspect of subject to the reader.

### LEARNING OUTCOMES

( After completing the course student will be able to: )

1. Explain classification of synthetic fibres, the role of degree of polymerization, molecular weight & other properties needed for fibre forming polymer
  2. Explain the process of viscose fibre manufacture & its properties
  3. Understand and able to explain different fibre spinning systems viz. melt spinning, solution spinning, dry spinning etc
  4. Explain the process of forming fibres like polyester, polyamide, polypropylene & their properties
  5. Explain the process of manufacture of PAN, & other high performance fibre
- 

### DETAILED CONTENTS

Unit 1:

Classification of man made fibres, definition of regenerated and synthetic fibres, Concepts of molecular weight, Degree of polymerization, Orientation and Crystallinity, Characteristics of fibre forming polymer.

Unit 2

Introduction to methods of fibre formation by melt spinning, dry spinning, & wet spinning, manufacturing process of Polyester fibre. Physical & chemical properties of polyester fibres, applications.

Unit 3

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Polyamide Fibres – History of development, Different types of polyamide fibres, Manufacturing process of Nylon-6, Nylon-66, Physical & chemical properties of Nylon-6 & Nylon-66 and applications.

#### Unit 4

Polyacrylonitrile fibres, Manufacturing process of Acrylic fibre, physical and chemical properties of acrylic fibres & its applications.

#### Unit 5

Introduction to regenerated fibre, Raw material for viscose rayon, Manufacturing sequence of viscose fibre, Introduction to Acetate and Cuprammonium rayons.

#### Recommended Books :

6. वस्त्र रेशे – उत्पादन विशेषताएँ एवं उपयोग – DR. D.B. Shakyawar & Dr. M.K. Singh, abhishek Publication Chandigarh/ New Delhi.
7. Textile Fibre by Ghol and Valansk`
8. S. P. Mishra, A text book of Fibres Science and technology, New Age International (p) Ltd 2000.
9. H V S Murthy, Textile Fibres- Textile Association Publication 1995.
10. Textile Fibres – I By Dr. V.A. Shenai

#### SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	16	20
2	14	20
3	16	20
4	10	20
5	10	20
<b>Total</b>	<b>56</b>	<b>100</b>

#### TEXTILE FIBRES-II

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## **List of Experiments**

1. To distinguish
  - i) Nylon from other fibres
  - ii) Polysters from other fibres
  
  - iii)Viscose rayon, Cuprammonium rayon and Acetate rayon from other fibres.
2. To distinguish Orlon Acrylic fibres from other fibres.
3. To identify fibres such as viscose rayon, Polyester, Nylon and Acrylic fibres under microscope and to draw their longitudinal and cross-sectional views.
4. Checking moisture regain of different man made textile fibres by shirley moisture meter and by good brand conditioning oven.
5. To identify the man made fibres by
  - (i) Staining test
  
  - (ii) Solubility test
  
  - (iii) Burning test
6. To do quantitative estimation of fibers in a blend.

## 2.5 TEXTILE CHEMICAL PROCESSING

L T P

6 - -

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

### LEARNING OUTCOMES

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

1. Understand the different Preparatory Process Required for dyeing of textile Materials.
2. Understand the different Dyeing Process Required for textile Materials.
3. Understand the different Printing Process Required for fabrics.

### DETAILED CONTENTS

#### (A) PREPARATORY PROCESS

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

#### (B) MERCERISATION

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

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

**(D) PRINTING** 1. Object of Printing 2. Methods of printing: Block, screen and spray printing. 3. Styles of printing : Elementary knowledge of direct. resists, discharge styles of printing.

**(E) FINISHING:** Object of Finishing - Elementary knowledge of different finishing processes.

### RECOMMENDED BOOKS

1. Basics of Textile Chemical Processing
2. Textile Chemical Processing (Central Board of Secondary Education in Collaboration with NIFT)
3. Bleaching, Mercerizing & Dyeing of cotton materials by R.S.Prayag

### SUGGESTED DISTRIBUTION OF MARKS

<b>Topic No.</b>	<b>Time Allotted (Periods)</b>	<b>Marks Allotted (%)</b>
1	20	30
2	8	10
3	20	25
4	16	15
5	14	15
<b>Total</b>	<b>84</b>	<b>100</b>

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## **2.6 WORKSHOP PRACTICE**

**L T P**

**- - 10**

### **RATIONALE**

In order to have a balanced overall development of diploma engineers, it is necessary to integrate theory with practice. General workshop practices are included in the curriculum in order to provide hands-on experience about use of different tools and basic manufacturing practices. This subject aims at developing general manual and machining skills in the students. In addition, the development of dignity of labour, safety at work place, team working and development of right attitude are the other objectives.

### **LEARNING OUTCOMES**

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

- Identify tools and equipment used and their respective functions.
- Identify different types of materials and their basic properties.
- Use and take measurements with the help of basic measuring tools/equipment.
- Select proper tools for a particular operation.
- Select materials, tools, and sequence of operations to make a job as per given specification/drawing.
- Prepare simple jobs independently and inspect the same.
- Follow safety procedures and precautionary measures.
- Use safety equipment and Personal Protection Equipment.

## DETAILED CONTENTS (PRACTICAL EXERCISES)

**Note:** The students are supposed to come in proper workshop dress prescribed by the institute. Wearing shoes in the workshop(s) is compulsory. Importance of safety and cleanliness, safety measures and upkeep of tools, equipment and environment in each of the following shops should be explained and practiced. The students should prepare sketches of various tools/jobs in their practical Notebook.

The following shops are included in the syllabus:

- 1 Fitting Shop
- 2 Sheet Metal Shop
- 3 Welding Shop
- 4 Foundry Shop
- 5 Machine Shop

### 1. FITTING SHOP

- 1.1 Use of personal protective equipment and safety precautions while working.
- 1.2 Basic deburring processes.
- 1.3 Introduction to fitting shop tools, marking and measuring devices/equipment.
- 1.4 Identification of materials. (Iron, Copper, Stainless Steel, Aluminium etc.)
- 1.5 Identification of various steel sections (flat, angle, channel, bar etc.).
- 1.6 Introduction to various fitting shop operations/processes (Hacksawing, Drilling, Chipping and Filing).
- 1.7 Job Practice
  - Job I Marking of job, use of marking tools, filing and use of measuring instruments. (Vernier caliper, Micrometer and Vernier height gauge).
  - JobII Filing a rectangular/square piece to maintain dimensions within an accuracy of  $\pm 0.25$  mm.
  - Job III Making a cut-out from a square piece of MS flat using hand hacksaw and chipping

## Job IV Drilling and tapping practice on MS Flat.

### 2. SHEET METAL SHOP

2.1 Introduction to sheet metal shop, use of hand tools and accessories e.g. different types of hammers, hard and soft mallet, sheet and wire gauge, necessary allowance required during job fabrication, selection of material.

2.1 Introduction and demonstration of hand tools used in sheet metal shop.

2.2 Introduction and demonstration of various machines and equipment used in sheet metal shop e.g. Shearing Machine, Bar Folder, Burring Machine,

2.4 Introduction and demonstration of various raw materials used in sheet metal shop e.g. black-plain sheet, galvanized-iron plain sheet, galvanised corrugated sheet, aluminium sheet etc.

2.5 Study of various types of nuts, bolts, rivets, screws etc.

2.6 Job Practice

Job I: Shearing practice on a sheet using hand shears.

Job II: Practice on making Single riveted lap joint/Double riveted lap Joint.

Job III: Practice on making Single cover plate chain type, zig-zag type and single rivetted Butt Joint.

### 3 WELDING SHOP – I

3.1 Introduction and importance of welding as compared to other material joining processes. Specifications and type of welding machines, classification and coding of electrodes, welding parameters, welding joints and welding positions. Materials to be welded, safety precautions.

3.2 Job Practice

Job I Practice of striking arc (Minimum 4 beads on 100 mm long M.S. flat).

Job II Practice of depositing beads on plate at different current levels. (Minimum 4 beads on M.S. plate at four setting of current level).

Job III Preparation of lap joint using arc welding process.

Job IV Preparation of T-joint using gas welding or arc welding on 100 mm x 6 mm MS Flat

## **4 FOUNDRY SHOP**

4.1 Study of metal and non-metals

4.2 Study and Sketch of the Foundry tools

4.3 Study and sketch of Cupola and pit furnace

4.4 To prepare green moulding sand and to prepare moulds (single piece and double piece pattern sweep mould)

4.5 Casting of non-ferrous (lead or aluminum)

## **5 MACHINE SHOP**

5.1 Study and sketch of lathe machine

5.2 Study and Sketch of grinders, milling machine, drilling machine and CNC machine.

5.3 Plain and step turning and knurling practice.

5.4 Study and sketch of planing/shaping machine and to plane a rectangle of cast iron.

## **MEANS OF ASSESSMENT**

- Workshop jobs
- Report writing, presentation and viva voce

## **RECOMMENDED BOOKS**

- 1.1 Workshop Technology I,II,III, by SK Hajra, Choudhary and AK Choudhary; Media Promoters and Publishers Pvt. Ltd. Mumbai.
- 1.2 Workshop Technology Vol. I, II, III by Manchanda; India Publishing House, Jalandhar.
- 1.3 Workshop Training Manual Vol. I, II by S.S. Ubhi; Katson Publishers, Ludhiana.
- 1.4 Manual on Workshop Practice by K Venkata Reddy; MacMillan India Ltd., New Delhi
- 1.5 Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd., New Delhi
- 1.6 Workshop Technology by B.S. Raghuvanshi; Dhanpat Rai and Co., New Delhi
- 1.7 Workshop Technology by HS Bawa; Tata McGraw Hill Publishers, New Delhi

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## Third Semester

### 3.1 ELECTRICAL TECHNOLOGY & ELECTRONICS

(Common With Three Year Diploma Course Carpet Technology, Textile Chemistry, Textile Technology)

**L T P**  
**5 - 2**

#### RATIONALE

The superiority of electricity as power over other means in use in home or industry cannot be denied. So, it is imperative to introduce the mechanical engineering students to electrical machines and their various uses.

#### LEARNING OUTCOMES

After completing the course, the students will be able to: • Faraday's Laws of electromagnetic induction. Self and mutual induction. • Relationship of voltage and current for pure resistance, pure inductance, and pure capacitive reactance, impedance. • Production of Three-phase voltage, advantages of three-phase supply. Concept of star and delta connections. • Measurement of power in a single phase and three-phase circuits by wattmeter, Use of digital multimeter for measurement of voltage, current, and testing of devices. • Basic idea of semiconductors P & N type. Semiconductor diodes, Zener diodes, and their applications in rectifiers. • Working principle, Constructional details of D.C. Generators & D.C. Motors. • Working principle and constructional details of a single-phase and 3-phase transformers.

#### DETAILED CONTENTS

- 1. Electric Induction (6 Periods)**
  - 1.1. Faraday's Laws of electromagnetic induction. Self and mutual induction. Statically and dynamically induced e.m.f., Lenz's law. Fleming's left-hand and right-hand rule.
- 2. A. C. Theory (6 Periods)**
  - 2.1. Production of alternating e.m.f. Definition of cycle, frequency, amplitude, time period, instantaneous, average, R.M.S. maximum values of sinusoidal wave. Form factor, peak factor. Representation of a sinusoidal quantity by a mathematical expression and phasor, phase and phase difference. Relationship of voltage and current for pure resistance, pure inductance, and pure capacitive reactance, impedance. Solution and phasor diagrams of simple R.L.C. series and parallel circuits. Active and reactive power. Significance of P.F.

- 3. Three Phase Circuits (6 Periods)**  
 3.1. Production of Three-phase voltage, advantages of three-phase supply. Concept of star and delta connections. Relationship between phase and line values of currents and voltages, Power in three-phase circuits, simple numerical problems.
- 4. Measurement & Measuring Instruments (8 Periods)**  
 4.1. Primary and secondary instruments-Indicating, Recording and Integrated instruments.  
 4.2. Working principle and construction of the following instruments.  
 4.3. Ammeter & Voltmeter (Moving coil & Moving Iron). Extension of their ranges.  
 4.4. Dynamometer type wattmeter.  
 4.5. Single Phase A. C. Energy Meter.  
 4.5.1. Measurement of power in a single phase and three-phase circuits by wattmeter, Use of digital multimeter for measurement of voltage, current, and testing of devices.
- 5. Electronics (6 Periods)**  
 5.1. Basic idea of semiconductors P & N type. Semiconductor diodes, Zener diodes, and their applications in rectifiers. Transistors-PNP and NPN-their characteristics and uses as an amplifier (Brief description only). Principle characteristics and application of SCR. Devices like UJT, FET, DIAC, TRIAC (Brief introduction, Introduction to operational amplifier, Introduction to basic logic gates and microprocessors.
- 6. D. C. Machines (6 Periods)**  
 6.1.D. C. Generator:  
 6.2.Working principle, Constructional details, e.m.f. equation, Types of generators and their applications.  
 6.3.D. C. Motor:  
 6.4.Working principle, Back e.m.f., Types of D. C. motor and elementary idea of their characteristics. Torque equation, Methods of speed control (Description Only).
- 7. Transformers (6 Periods)**  
 7.1. Working principle and constructional details of a single-phase and 3-phase transformers, e.m.f. equation, Losses and efficiency, Cooling of transformers, Elementary idea of auto transformers and welding transformers.
- 8. Synchronous machines (8 Periods)**  
 8.1. Alternators:  
 8.1.1. Working principle, Types of alternators, Constructional details, E.M.F. equation, Condition for parallel operation.  
 8.2. Synchronous Motors:  
 8.2.1. Working principle, Constructional details, Vector diagram, Effect of excitation on armature current and power factor, Synchronous condenser.
- 9. Induction Motors (8 Periods)**  
 9.1. Three Phase Induction Motors:  
 9.1.1. Working principle and constructional details-Types of induction motors- Slip ring and Squirrel cage. Slip in induction motors. Speed torque characteristic,

Starting and speed control. Application of induction motors in industry. General faults and their remedies.

9.2. Single Phase Induction Motors:

9.2.1. Working principle and constructional details and application of single-phase motors (Split phase, Capacitor start and Run Motor). A. C. series motors, General faults and their remedies.

**10. Electro Heating (5 Periods)**

10.1. Types of electro heating. Brief description of resistance ovens and induction furnace and core furnaces.

**11. Electroplating (5 Periods)**

11.1. Importance of electroplating, Principle of electroplating and equipment used. Processes used in electroplating, Anodizing.

**RECOMMENDED BOOKS**

1. A Textbook of Electrical Technology Vol - I | Basic Electrical Engineering | By S. Chand's by B L Theraja and AK Theraja
2. A Textbook of Electrical Technology Volume II : AC And DC Machines Book 1 of 1: A Textbook of Electrical Technology | by B L Theraja and A K Theraja
3. Electrical & Electronics Engineering Materials, Asian Publishers. Ram Prakash Gupta and Pooja Yadav.

**LIST OF PRACTICALS**

1. To change the speed and direction of rotation of d.c. shunt motor by
  - 1.1. Armature control method.
  - 1.2. Field control method.
2. To change the speed and direction of rotation of d.c. compound motor by
  - 2.1. Armature control method.
  - 2.2. Field control method.
3. To measure the terminal voltage with variation of load current of
  - 3.1. D.C. shunt generator.
  - 3.2. D.C. compound generator.
4. To perform load test on a single-phase transformer and determine its efficiency.
5. To start and run an induction motor by
  - 5.1. Star Delta Starter.
  - 5.2. Auto Transformer Starter.
6. To measure slip of an induction motor by direct loading.
7. To start and change the direction of rotation of an induction motor.
8. To measure the transformation ratio of a single-phase transformer.
9. To measure power and P.F. in a single-phase circuit by Ammeter, Voltmeter, and Wattmeter.

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10. To measure power and P.F. in a 3 phase/A.C. circuit by two-wattmeter method.
11. To calibrate a single-phase energy meter at different P.F.'s and different loads.
12. To locate the faults in an electrical machine by a megger.
13. To connect a fluorescent tube and note its starting and running current.
14. To draw characteristics of Silicon Controlled Rectifier (SCR).
15. Testing of electrical devices - Zener, Diode, Transistor, FET, UJT, SCR.
16. Use of operational amplifier as an adder, subtractor, comparator, differentiator, and integrators.

### **INSTRUCTIONAL STRATEGY**

Lectures, assignments, tutorial, group discussion, and literature review.

### **MEANS OF ASSESSMENT**

As per BTE, UP guidelines.

### **SUGGESTED DISTRIBUTION OF MARKS**

<b>Topic No.</b>	<b>Time Allotted (Periods)</b>	<b>Marks Allotted (%)</b>
1.	6	8
2.	6	8
3.	6	8
4.	8	12
5.	6	8
6.	6	8
7.	6	8
8.	8	13
9.	8	13
10.	5	7
11.	5	7
<b>Total</b>	<b>70</b>	<b>100</b>

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## 3.2 YARN TECHNOLOGY-I

L T P  
5 - 4

### RATIONALE

Yarn manufacturing is the vital process of the textile industry. Yarn Technology-I deals with the yarn manufacturing activities involved in industry.

### LEARNING OUTCOMES

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

- 1- Able to understand cotton ginning process i.e. saw ginning, roller ginning, macarthy ginning
- 2- Able to understand about blowroom process
- 3- Able to understand the cotton carding
- 4- Able to understand the cotton drawing and combing processes

### DETAILED CONTENTS

1. Introduction to various processes involve in conversion of fibre into yarn with flow chart.

#### 2. GINNING AND BALING:

Object and Classification of Ginning and Baling.

#### 3. MIXING AND BLENDING:

- i. Mixing and its importance, method of mixing. Advantages and disadvantages.
- ii. Description and working of automixer and other modern blenders.

#### 4. BLOW ROOM LINE:

- i. Blow Room: Objects of Blow room . Importance of opening and cleaning. Trash content, opening by nails, air currents and beaters.
- ii. Study of opening and cleaning machines e.g. Blending bale opener, hopper feeders, Step cleaner, S.R.R.L. opener, Shirley opener, Whitin axiflow machine, Air stream cleaner, Three bladed beater and Kirschner beater. Nature of waste extracted in various openers and beaters E. R. M. cleaner and Monocylinder beaters.
- iii. Construction & Working of Bale Plucker.
- iv. Use and working of cleaning trunks, Metal separators, Grid bars and leaf bar, Air filters, Condensers, Screens or Cages, Automatic distributors, Conveyors.

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- v. Lap forming mechanism, Object and mechanism of Calender Roller and their weightings.
- vi. Single process scutchers, Production and efficiency, Lap rejection Introduction of modern Blow Room lines like Rieter & Trutzschler. Uni mixer, Uni Flock, Blendo Mat, Uni blend, Cleano mat (CVT 123)
- vii. Feed regulating motions used in scutcher and their importance.
- viii. Lap measuring and doffing devices in scutcher.
- ix. Calculation of production of scutchers and other machines and efficiency.
- x. Calculation of lap length and measuring motions.
- xi. Draft calculations, draft constant, mechanical and actual draft.

## **5. CARDING:**

- i. Objects of carding, passage of material through the card, cards parts and their functions e.g. Feeding system Licker-in, moteknives, Back plate front plate, Cylinder, Flats, Doffer, Undercasing etc.
- ii. Theory of carding actions in a revolving flat card.
- iii. Drive of card parts.
- iv. Flexible and metallic card clothing. Types of clothing wires and its geometry.
- v. Method of mounting the card with flexible and metallic card clothing.
- vi. Brief Idea of maintenance of carding machine.
- vii. Calculation of speeds, drafts and productions of card and drawing machines.
- viii. Calculations of production, efficiency, draft and waste percentage.

## **6. DRAWING:**

- i. Objects of drawing, Construction of draw frame, its parts and their functions and passage of material through drawing frame.
- ii. Drawing rollers, Top and Bottom drafting rollers and their construction.

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- iii. Principles of doubling and drafting.
- iv. Gauging and setting of drafting rollers. Roller pressure and its distributions.
- v. Importance of stop motions, study of electrical stop motions. Study of different drafting systems e.g. 2/2, 2/3, 3/5, 4/4 and 4/5 drafting systems.
- vi. Importance and study of Autolevellers
- vii. Special features of high speed draw frame, their names and different models.
- viii. Defects and remedies in drafting operating.
- ix. Calculations based on draft & production in draw frame.

## **7. COMBING**

- i. Brief idea of combing and combing operation.
- ii. Detail description of Halmann & Nasmith comber.
- iii. Calculation of Noil% and production of comber.

## **YARN TECHNOLOGY -I LIST OF EXPERIMENTS**

1. Operation, Setting and Gauging of blending bale opener (hopper feeder) and To measure the dimension of various important parts of the machine.
2. To calculate the speed of different moving parts of blending bale opener (hopper feeder).
3. Operate and gauge the porcupine opener, step cleaner and other opening machines available in the workshop and also calculate speeds of different moving parts.
4. Operation, setting and maintenance of Kirschner beater and to calculate number of beats per inch of feed material.
5. Adjustments of the weight per yard of the lap and its length.
6. Cleaning maintenance of the feed regulating motion in scutcher.
7. Operate the card machine and produce sliver and to practice piecing lap and sliver.
8. To set and gauge different part of card machine.
9. Calculate the speeds of cylinder, flats, doffer and licker-in and other moving parts of card machine.
10. To calculate all tension drafts, all intermediate drafts, total drafts and draft constants of a card machine.
11. To calculate number of laps consumed per shift of eight hours.

### **INSTRUCTIONAL STRATEGY**

Teacher should take theory lecture, demonstration of concepts and prototy

### **MEANS OF ASSESSMENT**

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

### **RECOMMENDED BOOKS**

1. Technology of Sort Staple Spinning by W.Klein
2. Principle of Spinning by A.R. Khare

### SUGGESTED DISTRIBUTION OF MARKS

<b>Topic No.</b>	<b>Time Allotted (Periods)</b>	<b>Marks Allotted (%)</b>
1	2	5
2	4	10
3	8	10
4	18	20
5	20	25
6	10	20
7	8	10
<b>Total</b>	<b>70</b>	<b>100</b>

### 3.3 YARN TECHNOLOGY-II

L T P  
6 - 4

#### RATIONALE

Yarn manufacturing is the vital process of the textile industry. Yarn Technology-II deals with the yarn manufacturing activities involved in industry.

#### LEARNING OUTCOMES

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

- 1- To Understand about the principle and function of Roving process.
- 2- To understand the various aspect of Yarn Doubling
- 3- To understand the concept of Reeling
- 4- To Calculate production, Twist, TM in ring frame and doubling machine

#### DETAILED CONTENTS

##### 1. ROVING :

- (i) Objects of roving study and construction and functions of various parts of speed frame/ simplex and passage of material through them.
- (ii) Drafting mechanism, drive of drafting rollers, pressure on drafting rollers
- (iii) Basic principles of Cone drum.
- (iv) Twisting mechanic, study of motions required for twisting flyer and its functions.
- (v) Winding : Principle of winding, bobbin leading and flyer leading winding, drive of winding mechanism. Traverse motion given to bobbins, building motion and its functions.
- (vi) Differential motion, its objects and working principles, study of differential motion. Tweddle and smally package stability and content Optimization on simplex bobbin
- (vii) Calculation pertaining to production, twist, draft and winding.

##### 2. RING SPINNING:

- (i) Objects of ring frame, construction and functions of various parts of ring frames Viz Rings, Spindles, Balloon Control Rings, Spacer, Aprons, Cots, Spindle tape, Rising and Falling Lappets.
- (ii) Traveller, Function of Traveller, Traveller type, size and No.

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- (iii) Passage of material through ring frames.
- (iv) Twisting of Yarn, Effect of Twist, Twist terminology, Concept of twist multiplier, Factors affecting twist in spinning.
- (v) Principles of Roller drafting and Drafting systems e.g. W.S.T., S.K.F., Pneumatic drafting and their advantages, break draft and its effect.
- (vi) Building motion, its objects construction and working, Types of builds (i) Warp (ii) Filling (iii) Combination
- (vii) Drive of ring frame, Different systems of Ring Frame drive like Group drive, Single Motor Drive, VPS (Variable Pitch Sheath) and Dual Drive, Inverter drive.
- (viii) Causes of end breaks in ring frame.
- (ix) Limitation of Ring Spinning.
- (x) Yarn faults and their remedies.
- (xi) Recent developments in Ring Spinning.

#### **RING FRAME CALCULATION:**

- (i) Calculation of Draft twist, Production and efficiency for different counts of Yarns.
- (ii) Calculation of balancing machines used in spinning processes for various counts-Spin Plan.
- (iii) Concept of average mill count and 40's conversion.
- (iv) Traveller speed, traveller lag calculation.

#### **3. DOUBLING:-**

- (i) Two for One Twister - Basic principles, Machine geometry, Different types of T.F.O. twister. Production and efficiency calculation and Advantages over ring doubling.
- (ii) Fancy doubling Yarns, their objects and their production Viz. Ply Yarn, Tape Yarn, Core Yarn and Sewing Threads.
- (iii) Calculation of folded yarns.

#### **4. REELING & BUNDLING:**

Object and terminology, Types of Reels, Construction and working of Reels, Different system of Reeling. Yarn bundling and baling.

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## **YARN TECHNOLOGY -II**

### **LIST OF EXPERIMENTS**

1. Operate the ribbon lap machine and prepare laps and gauge the rollers of the machine.
2. To calculate all tensions drafts, Intermediate drafts, total drafts, Draft constant and Production of ribbon lap machine.
3. To operate and set timing of comber and prepare sliver.
4. Set and gauge various parts of comber.
5. To calculate and analyse the comber waste percentage practically and evaluate the combing efficiency.
6. To calculate all tension drafts, Intermediate drafts, Total drafts and Drafts constant and production of comber machine.
7. Calculate spindle speed, front roller speed and rate of traverse from machine particulars.
8. To lubricate and put the stop motion in proper working order of draw frame.
9. To calculate the speed of different moving parts of a draw frame machine
10. To calculate the production on draw frame per delivery per machine per shift of eight hours
11. To make cheeses on parallel winding machine and calculate drum speed and production.
12. Operate the doubling machine and produce folded yarn and to calculate twists constant, TPI, Spindle speed and production.
13. To Calculation twist constant and draft constant and production from machine particulars of ring frame.
14. Operate the machine and produce yarn.
15. Gauge the Spindle and Lappets.
16. Carryout the maintenance of ring frame practically.
17. To calculate spindle speed , Twist Constt, TPI & Production of ring doubler.
18. To learn about making spin plan, taking breaking study, snap study of idle spindles, labour allocation in Ring frame dept on assumption basis.



19. To study traveller speed & doff weight of Ring frame.
20. To calculate count Cint. & strength Cint. in Ring yarn on assumption basis.

### **INSTRUCTIONAL STRATEGY**

Teacher should take theory lecture, demonstration of concepts and prototype.

### **MEANS OF ASSESSMENT**

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

### **RECOMMENDED BOOKS**

1. Technology of Sort Staple Spinning by W.Klein
2. Principle of Spinning by A.R. Khare
3. Spun Yarn Technology by Carl A. Lawrence
4. Cotton Spinning Calculation and Yarn Cost by James Winterbot

### **SUGGESTED DISTRIBUTION OF MARKS**

<b>Topic No.</b>	<b>Time Allotted (Periods)</b>	<b>Marks Allotted (%)</b>
1	25	25
2	35	40
3	14	20
4	10	15
<b>Total</b>	<b>84</b>	<b>100</b>

### 3.4 FABRIC TECHNOLOGY-I

L T P  
6 - 4

#### **RATIONALE**

Fabric manufacturing is the vital process of the textile industry. Fabric Technology-I deals with the fabric manufacturing activities involved in industry.

#### **LEARNING OUTCOMES**

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

- 1- Able to understand winding process of cotton yarn
- 2- Able to understand warping process of cotton yarn
- 3- Able to understand sizing process of cotton yarn.
- 4 Able to understand the classification of weaving and different motions involve in it.

#### **DETAILED CONTENTS**

Introduction to various processes involved in the conversion of yarn into fabric.

##### **1. WINDING:**

1. Types of packages, Introduction to drum and precision winding.
2. Traversing mechanisms (Rotary, Reciprocating)
3. Uses and limitations of slow speed winding machines and essentials of high speed winding machines.
4. High speed and super high speed warp winding machines- Scholahorst auto coner, Savio, Murata winding machine.
5. Study of various types of slub catchers, traversing devices, tensioning devices, ribbon formation and methods of eliminating them. Full package stop motions. Different types of high-speed pirn winding machines with special reference to Lesona pirn winder.
6. Commonly occurring faults in warp winding, their causes and remedies.
7. Norms for slub catcher setting and tension levels.
8. Features of automatic pirn winding machines.
9. Bunch building mechanisms.

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10. Commonly occurring faults in pirn winding, their causes and remedies.

## **2. WARPING :**

11. Introduction to various ways of warping.

12. Types of creel and their description.

13. Slow speed and high speed beam warping machines.

14. Sectional warping machine.

15. Stop motions. measuring motions and tensioning devices.

16. Commonly occurring faults in warping and their causes and remedies.

## **3. SIZING:**

17. Object of warp sizing.

18. Introduction to various methods of sizing.

19. Study of slasher sizing machine and multi cylinder sizing machine

20. Detailed study of sizing machine, measuring and marking motion, beam creels, brake guide and tension rollers, sizing and squeezing rollers, drying cylinders, steam trap, sow box construction, Features of modern sow box leasing rods, adjustable comb, beam pressing motion, slipping friction motion.

21. Multicylinders and drying system machines with special reference to drying unit, Merits and demerits of slasher, multicylinder and hot air sizing machines. Introduction to foam, hot melt and cold sizing.

22. Various kinds of sizing ingredients used for cotton, polyster, viscose and their blends.

23. Preparation of size paste for light medium and heavy size for cotton and man-made fibres blend.

24. Manual and mechanical methods of drawing-i,n,and knotting, twisting of warp.

25. Commonly occurring faults in sizing, drawing in denting and knotting.

## **4. Classification of Weaving Machine :**

Brief Idea of Handloom and Plain loom.

## **5. Different Motion of Weaving :**

Primary motion, Secondary motion and Auxiliary motion.

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## **Fabric Technology-I**

### **LIST OF EXPERIMENTS**

1. Practice in preparing cones, cheeses and pirns from hanks or ring bobbins.
2. Practice in creeling and preparation of warp on sectional/mill warping machine of required number of ends and width.
3. Practice in creeling and preparation of warpers beam on Slow Speed warping machine of required warp plan.
4. Practice in creeling and preparation of warpers beam on High Speed warping machine of required warp plan.
5. Practice in operating sizing machine (if working model of sizing plant available).
6. Practice of size paste preparation in laboratory.
7. Practice of making weaver's knot in laboratory.
8. Practice in drafting and denting for different design draft.
9. Study and sketch the important parts of pirn winding machine.
10. Study and sketch the important parts of warp winding machine.
11. Study and sketch the important of sectional warping machine.

### **INSTRUCTIONAL STRATEGY**

Teacher should take theory lecture, demonstration of concepts and prototype

### **MEANS OF ASSESSMENT**

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

### **RECOMMENDED BOOKS**

1. Industrial Practices in weaving preparatory by Dr. Mukesh kr. Singh
2. Weaving Preparation technology by Dr. N . Gokarneshan
3. Principal of woven fabric manufacturing by Abjit Majumdar CRC press

### **Websites for Reference:**

<https://nptel.ac.in/courses/116102005>

### SUGGESTED DISTRIBUTION OF MARKS

<b>Topic No.</b>	<b>Time Allotted (Periods)</b>	<b>Marks Allotted (%)</b>
1	24	25
2	24	25
3	24	30
<b>4</b>	<b>6</b>	<b>10</b>
<b>5</b>	<b>6</b>	<b>10</b>
<b>Total</b>	<b>84</b>	<b>100</b>

### 3.5 FABRIC TECHNOLOGY-II

L T P  
6 - 4

#### **RATIONAL**

Weaving is a vital activity in textile industry. The two papers Weaving Textnology-I and Weaving Technology-II deal with the activities involved in the weaving process.

#### **LEARNING OUTCOMES**

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

- 1-To Understand the Various advanced shedding technique i.e., Dobby, Jacquard.
- 2-Able to Prepare Dobby Lattice and Jacquard Card.
- 3- To Understand various techniques of more than two coloured weft insertion.
- 4- To Understand the Automation in Shuttle Weaving.

#### **DETAILED CONTENTS**

##### **1. DOBBIES :**

- (i) Classification of dobbies.
- (ii) Study of single lift doobby -Keighley and Climax dobbies.
- (iii)Positive dobbies ( any two dobbies ).
- (iv) Timing and setting of dobbies.
- (v) Method of preparing doobby lattice and Pattern cards
- (vi) Synchronising of doobby with drop box.
- (vii)Cross border doobby.
- (viii)R. H. and L. H. doobby, doobby mounting, dwell of doobby.
- (ix) Commonly occurring faults and their remedies.
- (x) Calculation relating to production, efficiency, yarn requirements, waste etc for looms.

##### **2. MULTIPLE BOX MOTIONS**

- (i) Introduction to multiple box motions.

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- (ii) Kinds of multiple box motions.
- (iii) Study of Cowburn and Peck's box motion its card saving device, safety devices.
- (iv) Study of Knowle's box motion.
- (v) Study of pick at will box arrangement.
- (vi) Study of non-skip and skip motions.
- (vii) Preparation of chain for given pattern of weft.
- (viii) Commonly occurring faults in boxes of the above mechanisms and their remedies.

### **3. JACQUARD:**

- (i) Introduction to figure weaving.
- (ii) Kinds of jacquard.
- (iii) Double lift single cylinder jacquard.
- (iv) Double lift double cylinder jacquard.
- (v) Cross border jacquard.
- (vi) Single lift single cylinder jacquard
- (vii) Twilling jacquard.
- (viii) Gauge and Leno jacquard.
- (ix) Fine pitch Jacquard.
- (x) Pressure harness.
- (xi) Sectional harness.
- (xii) Harness building.
- (xiii) Harness ties.
- (xiv) Card cutting, Piano card cutting machine and lacing of cards
- (xv) Repairing, adjustments and timing of the above machines.
- (xvi) Commonly occurring faults in jacquard weaving and their remedies.

### **4. AUTOMATIC WEAVING:**

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(i) Feeler, cutter and three pick try motion.

(ii) Pirn changing mechanism.

(iii) Shuttle protector.

(iv) Shuttle changing mechanism.

(v) Centre selvedge motion.

## 5. GENERAL:

1. Cloth defects, their causes and remedies.

## INSTRUCTIONAL STRATEGY

Teacher should take theory lecture, demonstration of concepts and prototype.

## MEANS OF ASSESSMENT

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

## RECOMMENDED BOOKS

1. **Weaving: Machine, mechanism and Management by M.K. Talukdar**

2. **Principle Of Weaving by Mark& Rabinson**

3. **Weaving Technolgy-II by NCUTE**

Websites for Reference:

## SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	22	30
2	18	25
3	22	30
4	16	10
5	6	5
<b>Total</b>	<b>84</b>	<b>100</b>

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## **FABRIC TECHNOLOGY-II**

### **LIST OF EXPERIMENTS**

1. Practice of beam gaiting.
2. Practice of fixing and tuning the whole loom to run for perfect weaving.
3. Dismantling of various parts of dobby, their sketching and resetting.
4. Timing and adjustment of dobby for giving connection of T lever, Arm and Eccentric provided on the shaft. Barrel setting.
5. Practice of preparing dobby lattice.
6. Practice of operating loom fitted with dobby and weaving of cloth.
7. Practice of mending broken ends after levelling the healds.
8. Finding and removing faults in dobby weaving.
9. Fixing and tuning of drop box motion.
10. Chain preparation for different weft plans.
11. Sketching of various parts of drop box motion.

## Fourth Semester

### 4.1 COMMUNICATION SKILLS – II

**L T P**

**4 - 2**

#### RATIONALE

Knowledge of English Language plays an important role in career development. This subject aims at introducing basic concepts of communication besides laying emphasis on developing listening, speaking, reading and writing skills as parts of Communication Skill.

#### LEARNING OUTCOMES

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

- Frame correct sentences with illustrations
- Comprehend the language correctly
- Interpret the language correctly
- Use given material in new situations.
- Correspond effectively using various types of writings like letters, memos etc.
- Communicate effectively in English with appropriate body language making use of correct and appropriate vocabulary and grammar in an organised set up and social context.

#### DETAILED CONTENTS

1. Functional Grammar (16 periods)

1.1 Prepositions

1.2 Framing Questions

1.3 Conjunctions

1.4 Tenses

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2 Reading (16 periods)

2.1 Unseen Passage for Comprehension (Vocabulary enhancement - Prefixes, Suffixes, one word substitution, Synonym and Antonym) based upon the passage should be covered under this topic.

3 Writing Skill (24 periods)

3.1 Correspondence

a) Business Letters- Floating Quotations, Placing Orders, Complaint Letters.

b) Official Letters- Letters to Government and other Offices

3.2 Memos, Circular, Office Orders

3.3 Agenda & Minutes of Meeting

3.4 Report Writing

## LIST OF PRACTICALS

**Note:** Teaching Learning Process should be focused on the use of the language in writing reports and making presentations.

Topics such as Effective listening, effective note taking, group discussions and regular presentations by the students need to be taught in a project oriented manner where the learning happens as a byproduct.

## Speaking and Listening Skills

1. Debate
2. Telephonic Conversation: general etiquette for making and receiving calls
3. Offering- Responding to offers.

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4. Requesting – Responding to requests
5. Congratulating
6. Exploring sympathy and condolences
7. Asking Questions- Polite Responses
8. Apologizing, forgiving
9. Complaining
10. Warning
11. Asking and giving information
12. Getting and giving permission
13. Asking for and giving opinions

## **INSTRUCTIONAL STRATEGY**

Students should be encouraged to participate in role play and other student-centered activities in class rooms and actively participate in listening exercises

## **MEANS OF ASSESSMENT**

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

## **RECOMMENDED BOOKS**

1. Communicating Effectively in English, Book-I by RevathiSrinivas; Abhishek Publications, Chandigarh.
2. Communication Techniques and Skills by R. K. Chadha; Dhanpat Rai Publications, New Delhi.
3. High School English Grammar and Composition by Wren & Martin; S. Chand & Company Ltd., Delhi.
4. e-books/e-tools/relevant software to be used as recommended by AICTE/UBTE/NITTTR, Chandigarh.

**Websites for Reference:**

1. [http://www.mindtools.com/ page 8.html](http://www.mindtools.com/page 8.html) – 99k
2. <http://www.letstalk.com.in>
3. <http://www.englishlearning.com>
4. <http://learnenglish.britishcouncil.org/en/>
5. <http://swayam.gov.in>

**SUGGESTED DISTRIBUTION OF MARKS**

<b>Topic No.</b>	<b>Time Allotted (Periods)</b>	<b>Marks Allotted (%)</b>
1	16	28
2	16	28
3	24	44
<b>Total</b>	<b>56</b>	<b>100</b>

## 4.2 INDUSTRIAL SAFETY

(Common To Three Year Diploma Course Textile Chemistry, Textile Design, Textile Technology)

L T P  
4 - -

### RATIONALE

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

### LEARNING OUTCOMES

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

- 1- Understand the importance of safety in industry.
- 2- Prevent the primary level accidents
- 3- Understand the safety related engineering concepts
- 4- Understand industry related acts

### DETAILED CONTENTS

#### 1. INTRODUCTION:

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

#### 2. PRINCIPLES OF ACCIDENT PREVENTION:

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

#### 3. SAFETY PRECAUTIONS IN SPINNING AND WEAVING:

Safe guarding of machines- Statutory provisions related to safe guarding of machinery and working near unguarded machines. Ergonomics of machine guarding. Types of guards and guarding machines in textile industry. Incidental safety devices. Guarding of machines and safety precautions in Opening, Cleanning, Carding, Drawing, Combing, Corrected and Approved by BTE, U.P., Lucknow in CDC Meeting held on 19.08.2023

Fly frame, Ring frames, Rotors (spinning), Winding, Doubling, Warping, Sizing and Weaving operations.

#### **4. SAFETY PRECAUTION IN CHEMICAL PROCESS :**

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

#### **4 SAFETY ENGINEERING**

##### **Material Handling:**

Ergonomics of material handling, Principles of correct method of lifting objects of different size, shape and weight with safe use of accessories for manual handling.

Safety aspects of design and construction and use of material handling machinery use in textile industry- Lifts, Forks, Motor Trolleys, Over head cranes and Chain Pullies.

Principle of good illumination at work place and its recommended minimum standard. Lighting and Colour.

##### **Danger From Electricity:**

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

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

##### **Health and Welfare:**

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

#### **6. SAFETY STATUTES:**

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

## **INSTRUCTIONAL STRATEGY**

Teacher should take theory lecture, demonstration of concepts and prototype

## **MEANS OF ASSESSMENT**

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

## **RECOMMENDED BOOKS**

Health and Safety for Textile Industry by R Vettriselvan, T Jeya Sudha

A Text Book on Industrial Safety by Harsimran Singh Sodhi, Doordarshi Singh

## **Websites for Reference:**

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

## **SUGGESTED DISTRIBUTION OF MARKS**

<b>Topic No.</b>	<b>Time Allotted (Periods)</b>	<b>Marks Allotted (%)</b>
1	10	18
2	6	11
3	10	18
4	10	18
5	14	24
6	6	11
<b>Total</b>	<b>56</b>	<b>100</b>



### 4.3 TEXTILE TESTING-I

(Common To Textile Chemistry, Textile Technology)

L T P  
6 - 4

#### RATIONALE

As the name implies this paper aims to develop in the incumbent the capability of testing the products and its components for desired results. Without it a product can never be claimed for any standard.

#### LEARNING OUTCOMES

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

- 1- To understand the importance of textile testing
- 2- To understand use of statistics in testing
- 3- To understand fiber testing for various parameters
- 4- To understand yarn testing for various parameters

#### DETAILED CONTENTS

##### 1. IMPORTANCE OF TEXTILE TESTING:

Introduction to textile testing, properties of fibres, yarns and fabrics and their relevance in assessing the performance, of textiles during and after manufacture. Brief introduction of ISO.

##### 2 Sampling and Quality Control :

Definition of sample, sample size, sampling Technique, Introduction to quality control, Accuracy of measurement, presentation and analysis of data, SQC charts analysis of defects, difference between average and correlation. Standard deviation and coefficient of variation.

##### 3. FIBRE TESTING:

Fibre Length (mean length, effective length and staple length. .Fibre Length Measurement - Use of Baer sorter, Fibrograph, Uster-stapler, their principles of operation. Fiber strength testing by Precisely strength tester, stelometer.

- i.
- ii. Fibre Fineness Measurement - By cutting and weighing method, Sheffield micronair, Aerlometer, Maturity of cotton by caustic soda method and by airflow methods.

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iii. Role of Humidity - Absolute Humidity, Relative Humidity, moisture Regain, Moisture content.

iv. Introduction to H.V.I. (High Volume Instruments)

#### **4. YARN TESTING:**

- i. Concept of count, its measurement by different methods. Concepts of S & Z twist, relation between tpi, twist multiplier and count.
- ii. Measurement of yarn twist by Rock bank twist tester, continuous twist tester and by twist and untwist methods.
- iii. Measurement of yarn diameter by microscope.
- iv.

#### **5. EVENNESS:**

Nature of irregularities – short term, medium term and long term variations, periodic and non-periodic irregularities. Analysis of classmate and classifaults

## **TEXTILE TESTING-I LIST OF EXPERIMENT**

1. To find the count of yarn
  - (i) by physical balance
  - (ii) by yarn quadrants balance.
  - (iii) by Bessley yarn balance.and to calculate Coefficient of variation (CV).
2. To calculate yarn count by wrap reel and to calculate C.V..
3. Determine the twist of yarn per inch/per meter in double yarn and its individual components by continuous twist tester and twist and untwist tester.
4. Find out the hank of sliver and roving with the aid of wrap block machine.
5. Find the staple length of fibre by Bare Sorter.
6. Measure fibre fineness by flowing air through a sample of fibre by micronaire.
7. Find out fibre length by analytical digital fibrograph.
8. Find out lea strength of cotton yarn by lea strength tester (Power driven) and CSP.
9. Test evenness of the yarn by evenness tester.
10. Find out fiber strength by stelometer.

### **INSTRUCTIONAL STRATEGY**

Teacher should take theory lecture, demonstration of concepts and prototype

### **MEANS OF ASSESSMENT**

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

### **RECOMMENDED BOOKS**

1. Textile Testing- J.E.Booth
2. Physical testing of textile by B P Saville

### **Websites for Reference:**

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

### SUGGESTED DISTRIBUTION OF MARKS

<b>Topic No.</b>	<b>Time Allotted (Periods)</b>	<b>Marks Allotted (%)</b>
1	10	10
2	14	20
3	25	30
4	25	25
5	10	15
<b>Total</b>	<b>84</b>	<b>100</b>

## 4.4 YARN TECHNOLOGY – III

L T P  
6 1 -

### RATIONALE

Controls of activities in any process is an essential part of manufacturing process. This paper deals with process control in Spinning and Advance Yarn Manufacturing Process.

### NOTE:

Question paper will contain at least two compulsory questions from each part.

### LEARNING OUTCOMES

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

- 1-Understand the different process parameter in all spinning machine in yarn manufacturing.
- 2-Understand the modern spinning technique i.e., open end spinning,
- 3-Understand the concept of texturing and various texturing technique.
- 4-Differentiate between woollen, worsted and semi worsted spinning system.

### DETAILED CONTENTS

#### (1) PROCESS CONTROL IN SPINNING:

1. Control of mixing quality and cost, waste and cleaning in blow room and carding, comber waste yarn realisation.
2. Measurements and analysis of productivity, of different M/c.
3. Control of yarn count, strength, evenness and imperfections, statistical interpretation of data.
4. Breakage and efficiency studies and their analysis.

#### 2. ADVANCE SPINNING:

- (i) Open end spinning, Different styles of open end spinning such as Rotor spinning, Air jet spinning, Friction spinning, Air vortex spinning, Electrostatic spinning, Properties of open end spinning yarns defects of Open end spinning yarns.
- (ii) Tow To Top conversion processes- Stretch breaking and cutting methods. Tow characteristics, Different methods of tow to yarn conversion.

Principle of texturing, its importance and application, Method of texturing, Heat setting and texturing, False twisting, Development of false twisting machines, Stuffer box crimping.

Principle of draw texturizing machines involved e.g., Draw twister for texturized yarn, Draw winder, Cone winder. Edge crimping, Principle of air bulking and properties of air textured yarns. Effect of process variable on textured yarn quality.

(iii) Brief study of different processes involved in wollen and worsted spinning  
Properties of wollen and worsted yarns.

(iv) Principle & Working of compact spinning.

### **INSTRUCTIONAL STRATEGY**

Teacher should take theory lecture, demonstration of concepts and prototype

### **MEANS OF ASSESSMENT**

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

### **RECOMMENDED BOOKS**

1. Technology of Sort Staple Spinning by W.Klein
2. Principle of Spinning by A.R. Khare
3. Spun Yarn Technology by Carl A. Lawrence
4. Cotton Spinning Calculation and Yarn Cost by James Winterbottom

### **SUGGESTED DISTRIBUTION OF MARKS**

<b>Topic No.</b>	<b>Time Allotted (Periods)</b>	<b>Marks Allotted (%)</b>
1	40	40
2	44	60
<b>Total</b>	<b>112</b>	<b>100</b>

## 4.5 FABRIC TECHNOLOGY – III

L T P  
6 1 -

### RATIONALE

This paper deals with new developments in weaving processes basically in shuttle less weaving. In current time for high fabric production rate shuttle less weaving is necessary. To produce quality product ones should know about the process control in different stages of weaving.

### LEARNING OUTCOMES

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

- 1- Understand different process parameters in weaving to control the production and quality of fabric
- 2-Understand the working mechanism of Shuttle less loom i.e., Projectile, Rapier, Jet loom
- 3-Understand the multiphase loom.
- 4-Understand the Application area of Technical Textile.

### DETAILED CONTENTS

#### (1) PROCESS CONTROL IN WEAVING:

1. Measurement and control of quality and productivity and waste in winding, warping, sizing, drawing-in and weaving.
2. Common faults in weaving and their analysis and remedies.
3. Breakage and efficiency studies and their analysis and their improvement.

#### (2) ADVANCE WEAVING:

- (i) Principle of operation for shuttle less looms comparative study of new systems of weft insertions, Weft storage unit.
- (ii) Unwinding tensions - Package build and colour selection mechanisms.
- (iii) Types of Selvedge and their formation.
- (iv) Theoretical aspects of air jet, waterjet, projectile rapier system of weft insertion.
- (v) Working and detailed description of rapier and air jet Weaving machine, Weft transfer mechanism of rapier looms.
- (vi) Principle of multi-phase weaving.

### 3. NON WOVEN TECHNOLOGY :

Fabric Formation through different methods of non-woven tech.

#### INSTRUCTIONAL STRATEGY

Teacher should take theory lecture, demonstration of concepts and prototype

#### MEANS OF ASSESSMENT

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

#### RECOMMENDED BOOKS

- 1.Weaving: Machine, mechanism and Management by M.K. Talukdar
- 2.Principle Of Weaving by Mark& Rabinson
- 3.Handbooks of Weaving by Sabit Ad

#### SUGGESTED DISTRIBUTION OF MARKS

<b>Topic No.</b>	<b>Time Allotted (Periods)</b>	<b>Marks Allotted (%)</b>
1	40	40
2	58	60
<b>Total</b>	98	<b>100</b>



## 4.6 BASICS OF INFORMATION TECHNOLOGY

L T P

- - 6

### RATIONALE

Information technology has great influence on all aspects of life. Primary purpose of using computer is to make the life easier. Almost all work places and living environment are being computerized. The subject introduces the fundamentals of computer system for using various hardware and software components. 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 concept of information technology and its scope; operating a computer; use of various tools using MS Office/Open Office/Libre Office using internet etc., form the broad competency profile of diploma holders. This exposure will enable the students to enter their professions with confidence, live in a harmonious way and contribute to the productivity.

### Note:

**Explanation of Introductory part should be demonstrated with practical work. Following topics may be explained in the laboratory along with the practical exercises. There will not be any theory examination.**

### LEARNING OUTCOMES

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

- Identify Computer Hardware Components, Network Components and Peripherals.
- Explain the role of an Operating System.
- Install System and Application Software.
- Explain the function of the system components including Processor, Motherboard and Input-output devices.
- Use Word Processing Software to prepare document.
- Use Spreadsheet Software to create workbooks and automate calculation.
- Use Presentation Software to create interactive presentation.
- Perform fundamental tasks common to most application software including print, scan, save, edit, cut, copy, paste, format, spell and grammar check.
- Find and evaluate information on the Web.
- Install Antivirus.
- Safeguard against Online Frauds, threats and crimes.
- Use online office tools(Google suits)

## **TOPICS TO BE EXPLAINED THROUGH DEMONSTRATION**

1. Introduction to Computers and Peripherals.

Components of Computer, Types of Computer, CPU, RAM, ROM, Hard disk, USB, Flash drive, CD, DVD, Blue ray, Keyboard, Mouse, Monitor, LCD, Printer, Plotter, Scanner, Modem, Sound Cards, Speakers, CMOS battery, Sharing of Printers.

2. Operation System and Application Software

System Software, Application Software, Virtualization Software, Utility Software, MS Office/Open Office/Libreoffice, Working with window, Desktop components, Menu bars, creating shortcut of program. Installation of Application softwares, Antivirus and Drivers.

3. Word Processing, Spreadsheet and Presentation

Usage and creation of word document, spreadsheets and presentation, Google Suits (Google drive, google sheet, google doc. Google presentation)

4. Internet

Basics of Networking – LAN, WAN, Wi-Fi technologies, Concept of IP Addrsses, DNS, Search Engines, e-mail, Browsing and cyber laws.

### **LIST OF PRACTICAL EXERCISES**

1. Identify various components, peripherals of computer and list their functions.
2. Installation of various application software and peripheral drivers
3. Installation of operating system (windows/linux/others)
4. Creation and Management (Rename, delete, search of file and folders)
5. Installation of Antivirus and remove viruses
6. Scanning and printing documents
7. Browsing, Downloading, Information using Internet
8. E-Mail ID creation, comparing, sending and receiving e-mail. Attaching a file with e-mail message.
9. Word Processing (MS Office/Open Office)
  - a) File Management:
    - Opening, creating and saving a document, locating files, copying contents in some different file(s), protecting files, giving password protection for a file
  - b) Page set up:
    - Setting margins, tab setting, ruler, indenting
  - c) Editing a document:

- Entering text, cut, copy, paste using tool- bars
- d) Formatting a document:
- Using different fonts, changing font size and colour, changing the appearance through bold/italic/underlined, highlighting a text, changing case, using subscript and superscript, using different underline methods
  - Aligning of text in a document, justification of document, inserting bullets and numbering
  - Formatting paragraph, inserting page breaks and column breaks, line spacing
  - Use of headers, footers: Inserting footnote, end note, use of comments, autotext
  - Inserting date, time, special symbols, importing graphic images, drawing tools
- e) Tables and Borders:
- Creating a table, formatting cells, use of different border styles, shading in tables, merging of cells, partition of cells, inserting and deleting a row in a table
  - Print preview, zoom, page set up, printing options
  - Using find, replace options
- f) Using Tools like:
- Spell checker, help, use of macros, mail merge, thesaurus word content and statistics, printing envelopes and labels
  - Using shapes and drawing toolbar,
  - Working with more than one window .

## 10. Spread Sheet Processing (MS Office/Open Office/Libre Office)

Starting excel, open worksheet, enter, edit, data, formulae to calculate values, format data, save worksheet, switching between different spread sheets

- a) Menu commands:  
Create, format charts, organise, manage data, solving problem by analyzing data. Programming with Excel Work Sheet, getting information while working
- b) Work books:  
Managing workbooks (create, open, close, save), working in work books, selecting the cells, choosing commands, data entry techniques, formula creation and links, controlling calculations
- Editing a worksheet, copying, moving cells, pasting, inserting, deletion cells, rows, columns, find and replace text, numbers of cells, formatting worksheet, conditional formatting
- c) Creating a chart:

Working with chart types, changing data in chart, formatting a chart, use chart to analyze data

Using a list to organize data, sorting and filtering data in list

- d) Retrieve data with query:  
Create a pivot table, customizing a pivot table. Statistical analysis of data
- e) Exchange data with other application:  
Embedding objects, linking to other applications, import, export document.

## 11. PowerPoint Presentation (MS Office/Open Office/Libre office)

- a) Introduction to PowerPoint
  - How to start PowerPoint
  - Working environment: concept of toolbars, slide layout & templates.
  - Opening a new/existing presentation
  - Different views for viewing slides in a presentation: normal, slide sorter.
- b) Addition, deletion and saving of slides
- c) Insertion of multimedia elements
  - Adding text boxes
  - Adding/importing pictures
  - Adding movies and sound
  - Adding tables and charts etc.
  - Adding organizational chart
  - Editing objects
  - Working with Clip Art
- d) Formatting slides
  - Using slide master
  - Text formatting
  - Changing slide layout
  - Changing slide colour scheme

- Changing background
- Applying design template

## 12. Google Suits

Using Google drive, Google shut, Google docs, Google slides.

### **INSTRUCTIONAL STRATEGY**

Since this subject is practice oriented, the teacher should demonstrate the capabilities of computers to students while doing practical exercises. The students should be made familiar with computer parts, peripherals, connections and proficient in making use of MS Office/Open Office/Libre office/Google Suit in addition to working on internet. The student should be made capable of working on computers independently.

### **MEANS OF ASSESSMENT**

- Class Tests/Quiz
- Software Installation and Use
- Viva-Voce
- Presentation

### **RECOMMENDED BOOKS**

1. Fundamentals of Computer by V Rajaraman; Prentice Hall of India Pvt. Ltd., New Delhi
2. Information Technology for Management by Henery Lucas, Tata McGraw Hills, New Delhi
3. Computers Fundamentals Architecture and Organisation by B Ram, revised Edition, New Age International Publishers, New Delhi
4. Computers Today by SK Basandara, Galgotia publication Pvt Ltd. Daryaganj, New Delhi.
5. Internet for Every One by Alexis Leon and Mathews Leon; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
6. A First Course in Computer by Sanjay Saxena; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
7. Computer Fundamentals by PK Sinha; BPB Publication, New Delhi

8. Fundamentals of Information Technology by Leon and Leon; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
9. On Your Marks - Net...Set...Go... Surviving in an e-world by Anushka Wirasinha, Prentice Hall of India Pvt. Ltd., New Delhi
10. Fundamentals of Information Technology by Vipin Arora, Eagle Parkashan, Jalandhar

#### Online Resources

1. [www.tutorialspoint.com](http://www.tutorialspoint.com)
2. [www.sf.net](http://www.sf.net)
3. [Gsuite.google.com](http://Gsuite.google.com)
4. [Spoken-tutorial.org](http://Spoken-tutorial.org)
5. [Swayam.gov.in](http://Swayam.gov.in)

## 4.7 ENERGY CONSERVATION

**L T P**

**3 - 2**

### **RATIONALE**

The requirement of energy has increased manifolds in last two decades due to rapid urbanization and growth in industrial/service sector. It has become challenging task to meet ever increasing energy demands with limited conventional fuels and natural resources. Due to fast depletion of fossil fuels and a tremendous gap between supply and demand of energy, it is essential to adopt energy conservation techniques in almost every field like industries, commercial and residential sectors etc. Energy conservation has attained priority as it is regarded as additional energy resource. Energy saved is energy produced. This course covers the concepts of energy management and its conservation. It gives the insight to energy conservation opportunities in general industry and details out energy audit methodology and energy audit instruments.

### **LEARNING OUTCOMES**

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

- define principles and objectives of energy management and energy audit.
- understand Energy Conservation Act 2001 and its features.
- understand various forms & elements of energy.
- identify electrical and thermal utilities. Understand their basic principle of operation and assess performance of various equipments.
- identify areas of energy conservation and adopt conservation methods in various systems.
- evaluate the techno economic feasibility of the energy conservation technique adopted.

### **DETAILED CONTENTS**

1. Basics of Energy

- 1.1 Classification of energy- primary and secondary energy, commercial and non-commercial energy, non-renewable and renewable energy with special reference to solar energy, Capacity factor of solar and wind power generators.
  - 1.2 Global fuel reserve
  - 1.3 Energy scenario in India and state of U.P. Sector-wise energy consumption (domestic, industrial, agricultural and other sectors)
  - 1.4 Impact of energy usage on climate
- 
2. Energy Conservation and EC Act 2001
    - 2.1 Introduction to energy management, energy conservation, energy efficiency and its need
    - 2.2 Salient features of Energy Conservation Act 2001 & The Energy Conservation (Amendment) Act, 2010 and its importance. Prominent organizations at centre and state level responsible for its implementation.
    - 2.3 Standards and Labeling: Concept of star rating and its importance, Types of product available for star rating
- 
3. Electrical Supply System and Motors
    - 3.1 Types of electrical supply system
    - 3.2 Single line diagram
    - 3.3 Losses in electrical power distribution system
    - 3.4 Understanding Electricity Bill: Transformers Tariff structure, Components of power (kW, kVA and kVAR) and power factor, improvement of power factor, Concept of sanctioned load, maximum demand, contract demand and monthly minimum charges (MMC)
    - 3.5 Transformers: Introduction, Losses in transformer, transformer Loading, Tips for energy savings in transformers
    - 3.6 Electric Motors  
Types of motors, Losses in induction motors Features and characteristics of energy efficient motors, Estimation of motor loading, Variation in efficiency and power factor with loading, Tips for energy savings in motors
- 
- 4 Energy Efficiency in Electrical Utilities
    - 4.1 Pumps: Introduction to pump and its applications, Efficient pumping system operation, Energy efficiency in agriculture pumps, Tips for energy saving in pumps



- 4.2 Compressed Air System: Types of air compressor and its applications, Leakage test, Energy saving opportunities in compressors.
  - 4.3 Energy Conservation in HVAC and Refrigeration System: Introduction, Concept of Energy Efficiency Ratio (EER), Energy saving opportunities in Heating, Ventilation and Air Conditioning (HVAC) and Refrigeration Systems.
- 5 Lighting and DG Systems
- 5.1 Lighting Systems: Basic definitions- Lux, lumen and efficacy, Types of different lamps and their features, Energy efficient practices in lighting
  - 5.2 DG Systems: Introduction, Energy efficiency opportunities in DG systems, Loading estimation
- 6 Energy Efficiency in Thermal Utilities
- 6.1 Thermal Basics: Thermal energy, Energy content in fuels, Energy Units and its conversions in terms of Metric Tonne of Oil Equivalent (MTOE)
  - 6.2 Energy Conservation in boilers and furnaces : Introduction and types of boilers, Energy performance assessment of boilers, Concept of stoichiometric air and excess air for combustion, Energy conservation in boilers and furnaces, Do's and Don'ts for efficient use of boilers and furnaces
  - 6.2 Cooling Towers: Basic concept of cooling towers, Tips for energy savings in cooling towers
  - 6.3 Efficient Steam Utilization
7. Energy Conservation Building Code (ECBC)
- 7.1 ECBC and its salient features
  - 7.2 Tips for energy savings in buildings: New Buildings, Existing Buildings
- 8 Waste Heat Recovery and Co-Generation
- 8.1 Concept, classification and benefits of waste heat recovery
  - 8.2 Concept and types of co-generation system
- 9 General Energy Saving Tips
- Energy saving tips in:
- 9.1 Lighting
  - 9.2 Room Air Conditioner
  - 9.3 Refrigerator

- 9.4 Water Heater
- 9.5 Computer
- 9.6 Fan, Heater, Blower and Washing Machine
- 9.7 Colour Television
- 9.8 Water Pump
- 9.9 Cooking
- 9.10 Transport

## 10 Energy Audit

- 10.1 Types and methodology
- 10.2 Energy audit instruments
- 10.3 Energy auditing reporting format

### **PRACTICAL EXERCISES**

1. To conduct load survey and power consumption calculations of small building.
2. To check efficacy of different lamps by measuring power consumption and lumens using lux meter.
3. To measure energy efficiency ratio (EER) of an air conditioner.
4. To measure effect of valve throttling and variable frequency drive (VFD ) on energy consumption by centrifugal pump.
5. To measure and calculate energy saving by arresting air leakages in compressor.
6. To measure the effect of blower speed on energy consumed by it.

### **STUDENT ACTIVITIES ON ENERGY CONSERVATION/ENERGY EFFICIENCY**

- Presentations of Case Studies
- Debate competitions
- Poster competitions
- Industrial visits
- Visual Aids

### **INSTRUCTIONAL STRATEGY**

Teachers are expected to lay considerable stress on understanding the basic concepts in energy conservation, principles and their applications. For this purpose, teachers are

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expected to give simple problems in the class room so as to develop necessary knowledge for comprehending the basic concepts and principles. As far as possible, the teaching of the subject must be supplemented by demonstrations and practical work in the laboratory. Visits to industries must be carried out. Expert from industry must be invited to deliver talks on energy conservation to students and faculty.

## RECOMMENDED BOOKS

1. Guide book on General Aspects of Energy Management and Energy Audit by Bureau of Energy Efficiency, Government of India. Edition 2015
2. Guide book on Energy Efficiency in Electrical Utilities, by Bureau of Energy Efficiency, Government of India. Edition 2015
3. Guide book on Energy Efficiency in Thermal Utilities, by Bureau of Energy Efficiency, Government of India. Edition 2015
4. Handbook on Energy Audit & Environmental Management by Y P Abbi & Shashank Jain published by TERI. Latest Edition

### Important Links:

- (i) Bureau of Energy Efficiency (BEE), Ministry of Power, Government of India. [www.beeindia.gov.in](http://www.beeindia.gov.in).
- (ii) Ministry of New and Renewable Energy (MNRE), Government of India. [www.mnre.gov.in](http://www.mnre.gov.in).
- (iii) Uttar Pradesh New and Renewable Energy Agency (UPNEDA), Government of Uttar Pradesh. [www.upneda.org.in](http://www.upneda.org.in).
- (iv) **Central Pollution Control Board (CPCB)**, Ministry of Environment, Forest and Climate Change, Government of India. [www.cpcb.nic.in](http://www.cpcb.nic.in).
- (v) **Energy Efficiency Services Limited (EESL)**. [www.eeslindia.org](http://www.eeslindia.org).
- (vi) Electrical India, Magazine on power and electrical products industry. [www.electricalindia.in](http://www.electricalindia.in).

## **FIFTH SEMESTER**

### **5.1 INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP DEVELOPMENT**

<b>L</b>	<b>T</b>	<b>P</b>
<b>5</b>	<b>-</b>	<b>-</b>

#### **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. It may be further added that an entrepreneurial mindset with managerial skills helps the student in the job market. This subject focuses on imparting the necessary competencies and skills of enterprise set up and its management.

#### **LEARNING OUTCOMES**

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

- Know about various schemes of assistance by entrepreneurial support agencies
- Conduct market survey
- Prepare project report
- Explain the principles of management including its functions in an organisation.
- Have insight into different types of organizations and their structures.
- Inculcate leadership qualities to motivate self and others.
- Manage human resources at the shop-floor
- Maintain and be a part of healthy work culture in an organisation.
- Use marketing skills for the benefit of the organization.
- Maintain books of accounts and take financial decisions.
- Undertake store management.
- Use modern concepts like TQM, JIT and CRM.

#### **DETAILED CONTENTS**

##### **SECTION – A**

#### **ENTREPRENEURSHIP**

1. Introduction (04 Periods)
  - 1.1 Concept /Meaning and its need
  - 1.2 Qualities and functions of entrepreneur and barriers in entrepreneurship

- 1.3 Sole proprietorship and partnership forms and other forms of business organisations
  - 1.4 Schemes of assistance by entrepreneurial support agencies at National, State, District –level, organisation: NSIC, NRDC, DC, MSME, SIDBI, NABARD, NIESBUD, HARDICON Ltd., Commercial Banks, SFC’s TCO, KVIB, DIC, Technology Business Incubators (TBI) and Science and Technology Entrepreneur Parks
2. Market Survey and Opportunity Identification/Ideation (04 Periods)
    - 2.1 Scanning of the business environment
    - 2.2 Salient features of National and Haryana State industrial policies and resultant business opportunities
    - 2.3 Types and conduct of market survey
    - 2.4 Assessment of demand and supply in potential areas of growth
    - 2.5 Identifying business opportunity
    - 2.6 Considerations in product selection
    - 2.7 Converting an idea into a business opportunity
  3. Project report Preparation (06 Periods)
    - 3.1 Preliminary project report
    - 3.2 Detailed project report including technical, economic and market feasibility
    - 3.3 Common errors in project report preparations
    - 3.4 Exercises on preparation of project report
    - 3.5 Sample project report

## **SECTION –B**

### **MANAGEMENT**

4. Introduction to Management (06 Periods)
  - 4.1 Definitions and importance of management
  - 4.2 Functions of management: Importance and process of planning, organising, staffing, directing and controlling
  - 4.3 Principles of management (Henri Fayol, F.W. Taylor)
  - 4.4 Concept and structure of an organisation
  - 4.5 Types of industrial organisations and their advantages
  - 4.6 Line organisation, staff organisation
  - 4.7 Line and staff organisation
  - 4.8 Functional Organisation

5. Leadership and Motivation (08 Periods)
  - 5.1 Leadership: Definition and Need, Qualities and functions of a leader, Manager Vs leader, Types of leadership, Case studies of great leaders
  - 5.2 Motivation: Definition and characteristics, Importance of self motivation, Factors affecting motivation, Theories of motivation (Maslow, Herzberg, Douglas, McGregor)
  
6. Management Scope in Different Areas (14 Periods)
  - 6.1 Human Resource Management: Introduction and objective, Introduction to Man power planning, recruitment and selection, Introduction to performance appraisal methods
  - 6.2 Material and Store Management: Introduction functions, and objectives, ABC Analysis and EOQ
  - 6.3 Marketing and sales: Introduction, importance, and its functions, Physical distribution, Introduction to promotion mix, Sales promotion
  - 6.4 Financial Management: Introductions, importance and its functions, knowledge of income tax, sales tax, excise duty, custom duty, VAT, GST
  
7. Work Culture (08 Periods)
  - 7.1 Introduction and importance of Healthy Work Culture in organization
  - 7.2 Components of Culture
  - 7.3 Importance of attitude, values and behavior
  - 7.4 Behavioural Science – Individual and group behavior.
  - 7.5 Professional ethics – Concept and need of Professional Ethics and human values.
  
8. Basic of Accounting and Finance (10 Periods)
  - 8.1 Basic of Accounting: Meaning and definition of accounting, Double entry system of book keeping, Trading account, PLA account and balance sheet of a company
  - 8.2 Objectives of Financial Management: Profit Maximization v/s Wealth Maximization
  
9. Miscellaneous Topics (10 Periods)
  - 9.1 Total Quality Management (TQM): Statistical process control, Total employees Involvement, Just in time (JIT)
  - 9.2 Intellectual Property Right (IPR) : Introduction, definition and its importance, Infringement related to patents, copy right, trade mark

## INSTRUCTIONAL STRATEGY

Some of the topics may be taught using question/answer, assignment, seminar or case study 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 organisations on visit. Approach extracted reading and handouts may be provided.

## MEANS OF ASSESSMENT

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

## RECOMMENDED BOOKS

1. A Handbook of Entrepreneurship, Edited by BS Rathore and Dr JS Saini; Aapga Publications, Panchkula (Haryana)
2. Entrepreneurship Development and Management by J.S.Narang; Dhanpat Rai & Sons, Delhi.
3. Entrepreneurship Development by CB Gupta and P Srinivasan, Sultan Chand and Sons, New Delhi
4. Handbook of Small Scale Industry by PM Bhandari
5. Entrepreneurship Development and Management by MK Garg
6. E-books/e-tools/relevant software to be used as recommended by AICTE/UBTE/NITTTR, Chandigarh.

## Websites for Reference:

<http://swayam.gov.in>

## SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	04	06
2	04	06
3	06	08
4	06	08
5	08	12
6	14	20
7	08	12
8	10	14
9	10	14
<b>Total</b>	<b>70</b>	<b>100</b>

Corrected and Approved by BTE, U.P., Lucknow in CDC Meeting held on 19.08.2023

## 5.2 TEXTILE TESTING-II

(Common To Textile Chemistry, Textile Technology)

L T P  
4 2 4

### RATIONALE

As the name implies this paper aims to develop in the incumbent the capability of testing the products and its components for desired results. Without it a product can never be claimed for any standard.

### LEARNING OUTCOMES

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

- 1- Understand the different dimension of fabric.
- 2- Learn the tensile testing concepts of textile.
- 3- Learn the basic Textile chemical testing.

### DETAILED CONTENTS

#### 1. FABRIC DIMENSIONS:

- i. Measurement of fabric thickness. Measurement of crimp by crimp tester.
- ii. Air permeability of fabrics, its measurement by air permeability tester.
- iii. Crease recovery of fabrics, factors effecting crease recovery, measurements of crease recovery by crease recovery tester.
- iv. Water repellency tests.
- v. Abrasion resistance test on fabric by Mortindale Abrasion Tester.

#### 2. TENSILE TESTING OF TEXTILES:

- i. Yarn strength testing, types of testing machines, single yarn strength testing and Lea strength testing.
- ii. Fabric strength testing by cut strip, grab strip and revealed strip methods.

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iii. Fabric tear testing by tongue tear, trapezoid tear test.

iv. Bursting strength testing by hydraulic strength tester.

### **3. TEXTILE CHEMICAL TESTING:**

i. estimation of blend composition (Nylon, Polyester, Acrylic, Polyethylene, Cotton, wool, silk).

ii. Colour fastness to light

i. Colour fastness to washing

ii. Colour fastness to rubbing

iii. Colour fastness to perspiration

iv. Colour fastness to chlorine

v. Water absorbency test

## **TEXTILE TESTING-II LIST OF EXPERIMENT**

1. Examine the bursting strength of a fabric by bursting strength tester.
2. Find out the relative abrasion properties of fabrics by Martindale abrasion tester.
3. Find the breaking strength of different textile fabrics by means of cloth strength tester (power driven).
4. Measure crimp by Shirley crimp meter.
5. Find out air permeability of fabric by air permeability tester.
6. Measure crease recovery of fabric by crease recovery tester.
7. Test of pilling of fabrics by computerized pilling tester.
8. Estimation of final pH value of finished fabric.
9. Light fastness test
10. Washing fastness test
11. Rubbing fastness test
12. Perspiration fastness test
13. Absorbency test

### **INSTRUCTIONAL STRATEGY**

Teacher should take theory lecture, demonstration of concepts and prototype

### **MEANS OF ASSESSMENT**

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

### **RECOMMENDED BOOKS**

TEXTILE TESTING – J.E.BOOTH

### **Websites for Reference:**

**[www.nptel.ac.in](http://www.nptel.ac.in)**

### SUGGESTED DISTRIBUTION OF MARKS

<b>Topic No.</b>	<b>Time Allotted (Periods)</b>	<b>Marks Allotted (%)</b>
1	20	36
2	20	36
3	16	29
<b>Total</b>	<b>56</b>	<b>100</b>

## 5.3 FABRIC STRUCTURE & ANALYSIS

L T P  
6 2 -

### RATIONALE

The importance of the paper lies in the fact that it introduces the reader with different varieties of the fabric and designs and related technical terminology. Knowledge of these things very base of textile designer's working.

### LEARNING OUTCOMES

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

- 1- To understand about classification of woven fabrics.
- 2- To understand various technical items used in cloth construction.
- 3- Able to analysis the woven fabric structure.
- 4- To construct the elementary weaves.
- 5- To understand about special types of weaves.

### DETAILED CONTENTS

#### 1. INTRODUCTION:

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

- i. Definition of Warp and Weft, Ends and Picks. Determination of warp and weft in a given fabric. Design, Repeat of a design, Draft, Lifting or Peg plan and Denting order.
- ii. Types of drafts used in the manufacture of the fabrics.
- iii. Construction of plain weaves on point or graph paper. Relation of draft, design and peg plan.
- iv. Construction of plain weave and its derivatives in the form of simple Matt or Hopsack and Ribbed Structures.
- v. Various Hopsack or Matt weave designs with warp face, weft face and reversible effects.
- vi. Ornamentation of plain fabrics by different methods.

#### 2. TWILL WEAVES:

Construction of Twill weaves and their classification under the following heads.

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- i. Continuous regular twills.
- ii. Pointed twills.
- iii. Combined twills.
- iv. Rearranged twills.
- v. Broken twills.
- vi. Fancy twills.
- vii. Herring bone twills.

### **3. ANALYSIS OF FABRICS:**

- i. Analysis of a fabric and its objects. Confirmation of warp and weft and determination of weaving particulars from the given sample of a fabric.
- ii. Procedure for transferring the interlacement of ENDS and PICKS on graph paper for obtaining the design of the given sample of the fabric.

### **4. SATIN WEAVE:**

Characteristics and uses of satin and sateen weaves. Construction of regular and irregular satin and sateen.

### **5. DESIGN:**

Construction of the following design on point paper along with their draft, peg plan, denting order and weaving particulars.

- i. Diamond and Diaper weaves on pointed draft.
- ii. CREPE weaves by different methods and their characteristics.
- iii. Simple Honeycomb, Brighton Honeycomb, Huck-a back, weaves.
- iv. Mockleno weaves.

### **6. FABRICS :**

Calculation of fabric weight (GSM).

### **7. Miscellaneous Weaves :**

Design of following weaves only.

- i. Sponge weaves
- ii. Devon huck
- iii. Barley Corn
- v. Stitched hop-sack
- vi. Twilled hop-sack

### **INSTRUCTIONAL STRATEGY**

Teacher should take theory lecture, demonstration of concepts and prototype.

## MEANS OF ASSESSMENT

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

## RECOMMENDED BOOKS

1. Fabric Structure and Design by N. Gokarveshan.
2. Woven fabric structure design and product planning by Dr. J. Hayavadana.
3. Mastering weaves structure- Sharon Alderman-Inter weave Press.

## SUGGESTED DISTRIBUTION OF MARKS

<b>Topic No.</b>	<b>Time Allotted (Periods)</b>	<b>Marks Allotted (%)</b>
1	15	20
2	20	25
3	10	15
4	8	10
5	15	15
6	6	5
7	10	10
<b>Total</b>	<b>84</b>	<b>100</b>

## 5.4 TECHNICAL TEXTILE

L T P  
6 - -

### RATIONALE

Technical textiles are defined as textile materials and products used primarily for their technical performance and functional properties rather than their aesthetic or decorative characteristics. This course targets the specific areas of technical textiles depending on the product characteristics, functional requirements and end-use applications

### LEARNING OUTCOMES

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

1- Able to understand the different types of woven, knitted & nonwoven fabric as per use..

**2- Understand the role of different kind of special fabrics.**

**3- Understand the use of textile in Medical, construction & industrial purpose.**

#### Unit -1 :

Introduction to technical textile, types of technical textiles, textiles used in industry such as filtration, filter fabric construction- woven, needle felt & knitted filter fabric, finishing treatment of filter fabric, thermal and chemical properties of filter fabric, essential requirements of good filter fabric..

#### Unit -2 :

Manufacture and properties of protective textiles- water proof/coated and water repellent, antimicrobial, flame retardant, chemical resistance, Nuclear and biological resistance, mechanical resistance such as bullet proof, cut proof, stab proof

#### Unit -3:

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

#### Unit- 4:

Smart textiles, brief introduction of smart textiles, classification of smart textiles, passive smart textiles, active smart textiles, brief discussion of smart shirt, smart suit, musical jacket,

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space suit etc. automotive textiles: type cord, seat belt, air bag, seat upholstery, carpets, headliners, helmets etc, Agro textile: Shade net, green house film, Mulch net, crop cover, anti hail and bird protection net, finishing net etc.

### **Unit -5 :**

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

### **INSTRUCTIONAL STRATEGY**

Teacher should take theory lecture, demonstration of concepts and prototype

### **MEANS OF ASSESSMENT**

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

### **RECOMMENDED BOOKS**

- **Hand book on technical textile(Wood head publishing series in textile), [A R Horrocks](#) (Editor), [Subhash C. Anand](#) (Editor)**
- **High performance technical textile by roshan Paul**

### **Websites for Reference:**

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

### **SUGGESTED DISTRIBUTION OF MARKS**

<b>Topic No.</b>	<b>Time Allotted (Periods)</b>	<b>Marks Allotted (%)</b>
1	18	20
2	18	20
3	15	20
4	18	20
5	15	20
<b>Total</b>	<b>84</b>	<b>100</b>



## 5.5 COMPUTER AIDED DESIGN

L T P  
5 2 -

### RATIONALE

Diploma holders in mechanical Engineering with specialization in computer aided design are required to provide professional assistance in design of prototypes, tools jigs and fixtures. For this purpose, it is essential to impart knowledge and skills about computer aided graphics and design for enabling them to perform in this field. Hence this subject.

### LEARNING OUTCOMES

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

- 1- Understand the about display devices.
- 2-understand about Graphics & software.
- 3- Understand about design process using CAD software.

### DETAILED CONTENTS

#### 1. CAD Hardware

- 1.1 Different types of graphics display devices - Stroke writing, Raster, Beam Penetration colour CRT, Shadow mark colour CRT, TFT Monitor.
- 1.2 Input devices such as mouse, digitiser, light pen, joy stick, thumb wheel, track ball, Scanner.
- 1.3 Graphics output devices - plotters and printers

#### 2. Selection of an appropriate software

#### 3. Graphic Package

- 3.1 Ground rules for graphics package
- 3.2 Graphics package

#### 4. CAD Software - Application of CAD Software.

5. 2-D & 3-D transformations Translation, scaling, rotation, mirror and share, Zooming, Panning and Clipping.

#### 6. Design process and role of computers in design process

1. Benefits of CAD

## **INSTRUCTIONAL STRATEGY**

### **MEANS OF ASSESSMENT**

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

### **RECOMMENDED BOOKS**

#### **SUGGESTED DISTRIBUTION OF MARKS**

<b>Topic No.</b>	<b>Time Allotted (Periods)</b>	<b>Marks Allotted (%)</b>
1	70	100
<b>Total</b>	<b>70</b>	<b>100</b>

## 5.6 UNIVERSAL HUMAN VALUES

**L T P**  
**2 - 1**

### **COURSE OBJECTIVES**

This introductory course input is intended

- 1 To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity, which are the core aspirations of all human beings
- 2 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. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way
- 3 To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature

Thus, this course is intended to provide a much-needed orientational input in value education to the young enquiring minds.

### **COURSE METHODOLOGY**

1. The methodology of this course is explorational and thus universally adaptable. It involves a systematic and rational study of the human being vis-à-vis the rest of existence.
2. It is free from any dogma or value prescriptions.
3. It is a process of self-investigation and self-exploration, and not of giving sermons. Whatever is found as truth or reality is stated as a proposal and the students are facilitated to verify it in their own right, based on their Natural Acceptance and subsequent Experiential Validation.
4. This process of self-exploration takes the form of a dialogue between the teacher and the students to begin with, and then to continue within the student leading to continuous self-evolution.
5. This self-exploration also enables them to critically evaluate their pre-conditionings and present beliefs.

The syllabus for the lectures is given below:

- After every two lectures of one hour each, there is one hour practice session.
- The assessment for this subject is as follows:
- Sessions Marks (Internal): 20
- Practical Marks (External): 30
- Total Marks: 50

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**UNIT 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education (8 Periods)**

1. Understanding the need, basic guidelines, content and process for Value Education
2. Self-Exploration–what is it? - its content and process; ‘Natural Acceptance’ and
3. Experiential Validation- as the mechanism for self-exploration
4. Continuous Happiness and Prosperity- A look at basic Human Aspirations
5. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority
6. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
7. Method to fulfill the above human aspirations: understanding and living in harmony at various levels

**UNIT 2: Understanding Harmony in the Human Being - Harmony in Myself! (8 Periods)**

1. Understanding human being as a co-existence of the sentient ‘I’ and the material the Body’
2. Understanding the needs of Self (‘I’) and ‘Body’ - Sukh and Suvidha
3. Understanding the Body as an instrument of ‘I’ (I being the doer, seer and enjoyer)
4. Understanding the characteristics and activities of ‘I’ and harmony in ‘I’
5. Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail
6. Programs to ensure Sanyam and Swasthya  
-Practice Exercises and Case Studies will be taken up in Practice Sessions.

**UNIT 3: Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship (8 Periods)**

1. Understanding Harmony in the family – the basic unit of human interaction
2. Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti;
  - a. Trust (Vishwas) and Respect (Samman) as the foundational values of relationship
3. Understanding the meaning of Vishwas; Difference between intention and competence
4. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship
5. Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals
6. Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha )- from family to world family!

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- a. -Practice Exercises and Case Studies will be taken up in Practice Sessions.

**UNIT 4: Understanding Harmony in the Nature and Existence - Whole existence as Co-existence (8 Periods)**

1. Understanding the harmony in the Nature
  2. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature
  3. Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space
  4. Holistic perception of harmony at all levels of existence
- Practice Exercises and Case Studies will be taken up in Practice Sessions.

**UNIT 5: Implications of the above Holistic Understanding of Harmony on Professional Ethics (10 Periods)**

1. Natural acceptance of human values
2. Definitiveness of Ethical Human Conduct
3. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
4. Competence in professional ethics:
  - a. Ability to utilize the professional competence for augmenting universal human order
  - b. Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems,
  - c. Ability to identify and develop appropriate technologies and management patterns for above production systems.
5. Case studies of typical holistic technologies, management models and production
  - a. systems
6. Strategy for transition from the present state to Universal Human Order:
7. At the level of individual: as socially and ecologically responsible engineers, technologists and managers
8. At the level of society: as mutually enriching institutions and organizations
9. To inculcate Human Values among Students: The Role of self ,Parents and Teachers
10. -Practice Exercises and Case Studies will be taken up in Practice Sessions.

Practical Session also Includes Different Yogic Exercises and Meditation Session

**INSTRUCTIONAL STRATEGY**

The content of this course is to be taught on conceptual basis with plenty of real world examples.

**MEANS OF ASSESSMENT**

- Assignments and quiz/class tests,

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- Mid-term and end-term written tests
- Practical assessment

## REFERENCE MATERIAL

The primary resource material for teaching this course consists of

1. The text book (Latest Edition)  
Gaur, R Asthana, G P Bagaria, A foundation course in Human Values and professional Ethics, Excel books, New Delhi.
2. The teacher's manual (Latest Edition)  
Gaur, R Asthana, G P Bagaria, A foundation course in Human Values and professional Ethics – Teachers Manual, Excel books, New Delhi.
3. In addition, the following reference books may be found useful for supplementary reading in connection with different parts of the course:  
B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.  
PL Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Purblishers.
4. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
5. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
6. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, limits to Growth, Club of Rome's Report, Universe Books.
7. SubhasPalekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) KrishiTantraShodh, Amravati.
8. A Nagraj, 1998, JeevanVidyaekParichay, Divya Path Sansthan, Amarkantak.
9. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
10. A.N. Tripathy, 2003, Human Values, New Age International Publishers.

## RELEVANT WEBSITES, MOVIES AND DOCUMENTARIES

1. Value Education websites, <http://uhv.ac.in>, <http://www.aktu.ac.in>
2. Story of Stuff, <http://www.storyofstuff.com>
3. Al Gore, An Inconvenient Truth, Paramount Classics, USA
4. Charlie Chaplin, Modern Times, United Artists, USA
5. IIT Delhi, Modern Technology – the Untold Story
6. Case study Hevade Bazar Movie
7. RC Shekhar , Ethical Contradiction ,Trident New Delhi
8. Gandhi A., Right Here Right Now, Cyclewala Production

### SUGGESTED DISTRIBUTION OF MARKS

<b>Unit</b>	<b>Time Allotted (Periods)</b>	<b>Marks Allotted (%)</b>
1	8	20
2	8	20
3	8	20
4	8	20
5	10	20
<b>Total</b>	<b>42</b>	<b>100</b>

### 5.7 INDUSTRIAL TRAINING (4 Week)

Viva Voce	100
Sessional Marks	40
	----
Total	140
	----

#### PROPOSED GUIDE FOR STUDENTS TO PREPARE THEIR INDUSTRIAL VISIT REPORT

1. Name & Address of the unit
2. Date of
  - i. Joining.
  - ii. Leaving.
3. Nature of Industry
  - i. Product & Capacity.
  - ii. Services.
  - iii. Working Hrs.
4. Sections of the unit visited and activities there in.
5. Details of machines/Tools & instruments used in working in the section of the unit visited and its layout.
6. Work procedure in the section visited.
7. Specifications of the product of the section and materials used.
8. Work of repair and maintenance cell.
9. Details of the shops (welding, Foundary, Machines shop etc) related to repair and maintenance work.
10. Name of checking and Inspecting Instruments and their details. Quality controls measures taken.
11. Details of hadraulics/pneumatic/thermal units or appliances used. Material Handling Equipments.
12. Discription of any breakdown and its restoring.
13. Use of computer - if any.
14. Visit of units store, Manner of keeping store items, Their receiving & distribution.

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15. Safety measures on work place & working conditions in general - comfortable, convenient &hygeinic.

### **TRAINEES ASSESSMENT**

The Institute invites the comments on the work &behaviour of student during his stay in the industry from his immediate supervisors on the following points.

1. Name of the trainee

2. Date of

i. Joining.

ii. Leaving.

3.

i. Regularity & Punctuality

ii. Sense of responsibility

iii. Readiness to work/learn

iv. Obedience

v. Skill aquired

4. Name of the sections of the unit he attended during his stay. His activities/worth of being there.

5. Any thing specific

Sinnature of the Assessor

Date :-

Designation

## SIX SEMESTER

### 6.1 ENVIRONMENTAL STUDIES

**L T P**

**3 - 2**

#### RATIONALE

A diploma holder must have knowledge of different types of pollution caused due to industries and constructional activities so that he may help in balancing the ecosystem and controlling pollution by various control measures. He should also be aware of environmental laws related to the control of pollution. He should know how to manage the waste. Energy conservation is the need of hour. He should know the concept of energy management and its conservation.

#### LEARNING OUTCOMES

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

- Comprehend the importance of ecosystem and sustainable
- Demonstrate interdisciplinary nature of environmental issues
- Identify different types of environmental pollution and control measures.
- Take corrective measures for the abatement of pollution.
- Explain environmental legislation acts.
- Define energy management, energy conservation and energy efficiency
- Demonstrate positive attitude towards judicious use of energy and environmental protection
- Practice energy efficient techniques in day-to-day life and industrial processes.
- Adopt cleaner productive technologies
- Identify the role of non-conventional energy resources in environmental protection.
- Analyze the impact of human activities on the environment

#### DETAILED CONTENTS

1. Introduction (04 Periods)
  - 1.1 Basics of ecology, eco system- concept, and sustainable development, Resources renewable and non renewable.
2. Air Pollution (04 Periods)

- 2.1 Source of air pollution. Effect of air pollution on human health, economy, plant, animals. Air pollution control methods.
3. Water Pollution (08 Periods)
- 3.1 Impurities in water, Cause of water pollution, Source of water pollution. Effect of water pollution on human health, Concept of dissolved O<sub>2</sub>, BOD, COD. Prevention of water pollution- Water treatment processes, Sewage treatment. Water quality standard.
4. Soil Pollution (06 Periods)
- 4.1 Sources of soil pollution
- 4.2 Types of Solid waste- House hold, Hospital, From Agriculture, Biomedical, Animal and human, excreta, sediments and E-waste
- 4.3 Effect of Solid waste
- 4.4 Disposal of Solid Waste- Solid Waste Management
5. Noise pollution (06 Periods)
- Source of noise pollution, Unit of noise, Effect of noise pollution, Acceptable noise level, Different method of minimize noise pollution.
6. Environmental Legislation (08 Periods)
- Introduction to Water (Prevention and Control of Pollution) Act 1974, Introduction to Air (Prevention and Control of Pollution) Act 1981 and Environmental Protection Act 1986, Role and Function of State Pollution Control Board and National Green Tribunal (NGT), Environmental Impact Assessment (EIA).
7. Impact of Energy Usage on Environment (06 Periods)
- Global Warming, Green House Effect, Depletion of Ozone Layer, Acid Rain. Eco-friendly Material, Recycling of Material, Concept of Green Buildings.

## **ENVIRONMENTAL STUDIES**

### **LIST OF PRACTICALS**

1. Determination of pH of drinking water
2. Determination of TDS in drinking water
3. Determination of TSS in drinking water
4. Determination of hardness in drinking water
5. Determination of oil & grease in drinking water
6. Determination of alkalinity in drinking water
7. Determination of acidity in drinking water
8. Determination of organic/inorganic solid in drinking water
9. Determination of pH of soil
10. Determination of N&P (Nitrogen & Phosphorus) of soil
11. To measure the noise level in classroom and industry.
12. To segregate the various types of solid waste in a locality.
13. To study the waste management plan of different solid waste
14. To study the effect of melting of floating ice in water due to global warming

### **INSTRUCTIONAL STRATEGY**

In addition to theoretical instructions, different activities pertaining to Environmental Studies like expert lectures, seminars, visits to green house, effluent treatment plant of any industry, rain water harvesting plant etc. may also be organized.

### **MEANS OF ASSESSMENT**

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

### **RECOMMENDED BOOKS**

1. Environmental and Pollution Awareness by Sharma BR; Satya Prakashan, New Delhi.
2. Environmental Protection Law and Policy in India by Thakur Kailash; Deep and Deep Publications, New Delhi.
3. Environmental Pollution by Dr. RK Khitoliya; S Chand Publishing, New Delhi
4. Environmental Science by Deswal and Deswal; Dhanpat Rai and Co. (P) Ltd. Delhi.
5. Engineering Chemistry by Jain and Jain; Dhanpat Rai and Co. (P) Ltd. Delhi.
6. Environmental Studies by Erach Bharucha; University Press (India) Private Ltd., Hyderabad.
7. Environmental Engineering and Management by Suresh K Dhamija; S K Kataria and

Sons, New Delhi.

8. E-books/e-tools/relevant software to be used as recommended by AICTE/UBTE/NITTTR, Chandigarh.

**Websites for Reference:**

<http://swayam.gov.in>

**SUGGESTED DISTRIBUTION OF MARKS**

<b>Topic No.</b>	<b>Time Allotted (Periods)</b>	<b>Marks Allotted (%)</b>
1	04	10
2	04	10
3	08	20
4	06	14
5	06	14
6	08	20
7	06	12
<b>Total</b>	<b>42</b>	<b>100</b>

## 6.2 ADVANCE FABRIC STRUCTURE

L T P  
6 2 -

### RATIONALE

The paper deals with more complicated structures of today's fabrics. This knowledge is essential for modern textile technologists.

### LEARNING OUTCOMES

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

- 1- Construct the advanced design on graph paper.
- 2- Understand the manufacturing technique of the advanced design in weaving machine
- 3- Identify the Application Area of the advanced design.
- 4- Differentiate between basic weave and advanced weave.

### DETAILED CONTENTS

#### 1. WELTS AND PIQUES:

Varieties and characteristics of piques and welts, methods of embellishing pique fabrics, their structure, plain pique, backed pique, fast backed welts and waved pique.

#### 2. BED FORD CORDS:

Plain faced bedford, wadded bedford cord, bedford cord arranged with alternate picks and cords containing odd number of ends. twill-faced bedford cord.

#### 3. BACKED FABRICS (WARP AND WEFT):

Backed fabrics, wadded warp and weft backed fabrics, their beaming and drafting procedure.

#### 4. EXTRA WARP AND WEFT:

Principles of figuring with extra warp and weft one and one i.e. pick and pick wefting, two and two wefting. Methods of disposing of extra threads on the back of the fabric. Spot figures with extra warp and extra weft arranged in a particular order.

#### 5. DOUBLE CLOTH:

Construction of double and multiple cloths on design paper, their beaming, drafting and pegging. Types of double structures viz.

(i) Tubular Fabrics.

(ii) Double-faced Fabrics.

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(iii) Fabrics opening to double the width.

(iv) Double equal plain fabrics.

(v) Centre stitched double cloth.

## **6. GAUZE AND LENO FABRICS:**

Structure of gauze and leno fabrics, bottom and top douping. Different types of sheds formed in gauge and leno fabrics, comparison of gauge and leno. Combination of gauge and other weaves, striped patterns.

## **7. TURKISH TOWELLING:**

Principles of formation of pile, construction of three, four, five and six pick terry fabrics their methods of drafting and denting. Terry ornamentation.

## **8. SPECIAL LENO STRUCTURES:**

Cellular tennis shirting, Russian cords, Net Lenos, combination of gauge and leno with extra warp and extra weft. Two doup pattern, Distorted weft and styles.

## **9. PILE FABRICS:**

Designing of plain warp pile fabrics in detail. reversible warp pile structure and double plush weaving. Weft pile fabrics, twill back velveteens, Corduroy fabrics, weft plushes. Varieties of suiting fabrics. Distinctive features and modification of toilet fabrics.

## **10. LAPPET AND SWIVEL WEAVING:**

Introduction Only

## **11. Analysis of Fabrics.**

## **12. CAD in Textiles : Introduction only**

### **INSTRUCTIONAL STRATEGY**

Teacher should take theory lecture, demonstration of concepts and prototype

### **MEANS OF ASSESSMENT**

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

### **RECOMMENDED BOOKS**

1. Fabric Structure and Design by N.Gokarveshan
2. Watson's textile design & colour by Z.J.Grosicki.

Corrected and Approved by BTE, U.P., Lucknow in CDC Meeting held on 19.08.2023

3. Woven fabric structure design and product planning by Dr. J. Hayavadana
4. Mastering weaves structure- Sharon Alderman-Inter weave Press
5. Advanced Textile Design by Watson
6. Woven Textile Tructure by B. K. Behera and P. K. Hari
7. Advances in 3D Textiles by Xiaogang Chen
8. Practical Approach to 3D Weaving

#### **SUGGESTED DISTRIBUTION OF MARKS**

<b>Topic No.</b>	<b>Time Allotted (Periods)</b>	<b>Marks Allotted (%)</b>
1	8	10
2	8	10
3	8	10
4	8	10
5	10	12
6	8	10
7	9	10
8	9	5
9	10	15
10	4	4
11	4	4
<b>Total</b>	<b>84</b>	<b>100</b>



## 6.3 PRINCIPLE AND DESIGN OF SPINNING MACHINE

L T P  
6 2 -

### **RATIONALE:**

This paper deals with basic information about the various types spinning process of fibres (natural or artificial) used as raw materials in textile manufacture

### **LEARNING OUTCOMES**

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

- 1-Able to understand the transfer of motion through machine parts.
- 2-Able to understand the concept of designing of different spinning machines.

### **DETAILED CONTENTS**

#### **Unit 1:**

Transmission of motion through belts, ropes, chains, tapes etc. Tangential belt drive, Variable speed drive, Design of cone drums for Scutcher, principles of mixing, opening, cleaning in Blow Room line, difference in aerodynamics of lint and trash and its utilization in blow room Machinery design, redesigning of openers by using different principles for better performance.

#### **Unit 2:**

Transmission of motion to various parts of carding machine, detail study of varieties of licker-in, cylinder and flat clothing and its influence on carding performance, different systems of carding web collection, sliver coiling system, Inertia of carding engine, latest carding machine developments.

#### **Unit 3:**

Concept of lap formation for comber, designing concept of comber cylinder, top comb, detaching system, concept of noil control, latest machinery developments in comber frame.

#### **Unit 4:**

Different drafting systems in draw frame, roller weighing system, roller setting, and different stop motion, Differential motions used in speed frame, design of cone drums for speed frame, Design of flyer, spindle vibration measurement and control, building motion of speed frame.

#### **Unit 5:**

Design and analysis of ring frame comes, designing concept of building motion of ring frame, design of ring spindle and bolster, designing concept of various rings and travelers.

## **INSTRUCTIONAL STRATEGY**

Teacher should take theory lecture, demonstration of concepts and prototype

## **MEANS OF ASSESSMENT**

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

## **RECOMMENDED BOOKS**

- **Principal of spinning –fibers and blowroom cotton processing in spinning by Ashok R. Khare**

## **Websites for Reference:**

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

## **SUGGESTED DISTRIBUTION OF MARKS**

<b>Topic No.</b>	<b>Time Allotted (Periods)</b>	<b>Marks Allotted (%)</b>
1	17	25
2	17	25
3	17	25
4	16	25
5	17	25
<b>Total</b>	<b>84</b>	<b>100</b>

## 6.4 PRINCIPLE AND DESIGN OF WEAVING MACHINE

L T P  
6 2 -

### **RATIONALE:**

**This paper deals with** basic information about the various types weaving process of yarn both (natural or artificial) used as raw materials in textile manufacture

### **LEARNING OUTCOMES**

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

- 1- Able to understand the transfer of motion through machine parts in weaving loom
- 2- Able to understand the concept of designing of different weaving machines.
- 3- Able to understand various machine drives.

### **DETAILED CONTENTS**

#### **Unit 1:**

Designing concepts of drum winding, designing of winding drum, traverse indifferent winding machines, Concepts of latest tensioners for winding, designing concept of slub catchers.

#### **Unit 2:**

Designing concepts of warping drums, sectional warping, designing concepts of high efficiency creels, Transmission of motion in warping machines, concept of designing of stop motions in warping.

#### **Unit 3:**

Designing concept of saw box for sizing machine, designing of drying cylinder, heating system for drying cylinder, Concept of cold sizing for worsted warp sizing, latest machinery developments in sizing machines

#### **Unit 4:**

Principles governing the design of looms. Mechanics of basic weaving operations, Kinetics of slay, slay eccentricity, designing concepts of tappet for different twill weaves, warp tension measurement and its control, Different picking system, weft insertion system of sulzer, rapier, airjet and waterjet systems.

#### **Unit 5:**

Brief introduction of electronic Dobby and Jacquard, Designing concept of multiphase weaving, mechanism of different stop motions on shuttleless looms.

## **INSTRUCTIONAL STRATEGY**

Teacher should take theory lecture, demonstration of concepts and prototype

## **MEANS OF ASSESSMENT**

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

## **RECOMMENDED BOOKS**

- **Principal of weaving machine by the textile institute.**

## **SUGGESTED DISTRIBUTION OF MARKS**

<b>Topic No.</b>	<b>Time Allotted (Periods)</b>	<b>Marks Allotted (%)</b>
1	17	25
2	17	25
3	17	25
4	16	25
5	17	25
<b>Total</b>	<b>84</b>	<b>100</b>

**6.5 INTRODUCTION TO KNITTING AND GARMENT TECHNOLOGY**  
(COMMON TO TEXTILE TECHNOLOGY, TEXTILE CHEMISTRY)

**L T P**  
**4 - 4**

**RATIONALE**

This paper deals with new developments in knitting and garment technology. This knowledge is the need of the hour to pace with the time.

**LEARNING OUTCOMES**

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

- 1-To understand the basic concept of knitting
- 2-To understand concept of loop formation with help of needles
- 3-To understand garment making

**DETAILED CONTENTS**

**1. KNITTING :**

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

**2. LOOP FORMATION WITH NEEDLE :**

Running position, clearing position, Feeding position, Knocking over positions, Knitting position.

**3. KNITTING NEEDLES :**

Beard, Latch, Compound type of knitting needles, Advantages and disadvantages of beard and latch type.

**4. STITCHES :**

Knit, tuck and floats and its comparison.

**5. TYPES OF LOOPS :**

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

**6. GARMENT CLASSIFICATION :**

Garment classification for men and women. Fabric selection for garment and properties.

Corrected and Approved by BTE, U.P., Lucknow in CDC Meeting held on 19.08.2023

Measurement and its importance, Methods of taking important body measurements for gents And ladies garments.

#### **7. PATTERNING AND GRADING :**

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

#### **8. TYPES OF SLEEVES, COLLARS, POCKETS, ETC.**

#### **9. SPREADING, CUTTING AND SORTING :**

Objectives of spreading, Methods of spreading, cutting and sorting.

#### **10. SEWING TECHNOLOGY :**

Classification of stitch, Types of seams sewing tools and part of sewing machine.

#### **11. STITCHING DEFECTS & THEIR REMEDIES.**

# **INTRODUCTION TO KNITTING AND GARMENT TECHNOLOGY (COMMON TO TEXTILE TECHNOLOGY AND TEXTILE CHEMISTRY)**

## **LIST OF PRACTICALS**

1. Standard measurement for children.
2. Bodies block for
  - i. 3 Years child
  - ii. Grown up woman
  - iii. Grown up man
3. Application of the principle and technique of pattern making for design and construction of -
  - i. Blouse
  - ii. Ladies suit
  - iii. Gents shirts
  - iv. Pant.
4. Drafting of different types of sleeves and collars.
5. Study of construction and working of knitting machine Parts.

## **INSTRUCTIONAL STRATEGY**

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

## **MEANS OF ASSESSMENT**

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

## **RECOMMENDED BOOKS**

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

## **Websites for Reference:**

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

## SUGGESTED DISTRIBUTION OF MARKS

<b>Topic No.</b>	<b>Time Allotted (Periods)</b>	<b>Marks Allotted (%)</b>
1	3	6
2	3	6
3	7	13
4	5	9
5	5	9
6	7	13
7	5	9
8	5	6
9	6	11
10	6	11
11	4	7
<b>Total</b>	<b>56</b>	<b>100</b>



## 6.6 PROJECT

L T P  
- - 8

Ten periods per week are allotted for project work in the final year of the course. In classroom students (i) be encouraged and helped for developing new designs in yarn/weave (ii) be given clear idea of establishing a spinning/weaving unit of given size beginning from selection of site, deciding type of building construction/shed, units of machinery required, their layout. Fundamental requirements of spinning and weaving mill organisation. Deciding number of workers and their type. Process control in spinning and weaving departments, elements of costing and costing procedures in various sections, Factors affecting productivity and efficiency of men and machines, sources of finance and development of resources. For general awareness students be introduced to organisations involved in certification, standardisation, research and development of textile products Viz. BIS, Centre Silk Board, Textile Committee, Textile Commission, Jute Commission, ATIRA, NITRA, BTRA, etc.

This will contain the problems to evaluate students learning.

It will contain two types of problems

- (i) relating to development of designs in yarn/weave and preparing their samples.
- (ii) relating to establishment of a spinning / weaving unit of given size.

The student will be allowed to choose one either kind of the problem to solve.

1. Examination Marks		100
Project Work		70
Viva Voce		30
Sessional Marks	50	50
	----	-----
Total	150	150
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## RESOURCE REQUIREMENT

### 10.1 PHYSICAL RESOURCES

#### (A) Space requirement

Norms and standards laid down by All India Council for Technical Education (AICTE) are to be followed to work out space requirement in respect of class rooms, tutorial rooms, drawing halls, laboratories, space required for faculty, student amenities and residential area for staff and students.

#### (B) Equipment requirement:

Following Laboratories are required for Diploma Programme in Textile Chemistry

- Communication Laboratory
- Applied Physics Laboratory
- Applied Chemistry Laboratory
- Engineering Drawing
- General Mechanical Engineering
- Basics of Information Technology/Computer Laboratory
- Carpentry Shop
- Painting and Polishing Shop
- Electrical Shop
- Smithy Shop
- Fitting and Plumbing Shop
- Sheet Metal Shop
- Welding Shop
- Foundry Shop
- Machine Shop
- Textile Fibers Laboratory
- Yarn Technology Laboratory
- Fabric Technology Laboratory
- Textile Testing Laboratory
- Introduction to Knitting and Garment Laboratory
- Environmental Engineering Lab
- Energy Conservation Lab

## EQUIPMENT REQUIREMENT FOR TEXTILE ENGINEERING

Sr. No.	Description	Qty	Total Price (Rs)
<b>COMMUNICATION LABORATORY</b>			
1.	Stools	40	10,000
2.	Display Board/Screen	2	6,000
3.	Sound recording and playing system	1	6,000
4.	Audio cassettes	60	2,000
5.	Overhead Projector	1	5,000
6.	Transparencies slides	100	500
7.	TV, VCR and camera for video recording	1 each	20,000
8.	English spoken course	1	2,000
9.	A Quiz room equipped with two way audio system, back projection system and slide projector	1	30,000
10.	Miscellaneous	LS	1,500
<b>APPLIED PHYSICS LABORATORY</b>			
1.	Vernier calipers Working length 160 mm, Internal and external dia with locking arrangement	12	2,000
2.	Screw Gauges Working length 15 mm, pitch 0.5 mm, least count .005 mm	12	2,000
3.	Spherometers Distance between legs 2.5 mm, pitch 0.5 mm, least count .005 mm.	12	2,000
4.	Mirrors (convex, concave)	5 Each	1,500
5.	Pendulum Setup	02	4,000
6.	Gravesand's Apparatus	02	3,000
7.	Inclined Plane Setup	02	2,000

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8.	Flywheel Setup	02	4,000
9.	Prism	05	1,500
10.	Spectrometer	02	25,000
11.	DC Ammeters Moving coil weston-type ammeter with ebonite stand	10	3,500
12.	DC Miliammeters	2	1,000
13.	DC Microammeters	2	700
14.	DC voltmeters	10	700
15.	DC Millivoltmeters	10	2,000
16.	Sensitivity Galvanometer	2	800
17.	Student Galvanometers	10	4,000
18.	Demonstration type DC Ammeters Range; 0 to 1 Amp.	2	1,000
19.	D type DC Voltmeter Range : 0 to 1 Volt	2	1,000
20.	D type Galvanometers Sensitivity : 20 microamperes per scale division,	8	8,000
21.	Resistance boxes (dial type) assorted	8	8,000
22.	Rheostats	10	4,000
23.	Miscellaneous items (Spring, Pan, Glycerine, Optic fibre, Ferromagnetic material)	LS	2,000
24.	Fortin's Barometer (Wall type)	2	20,000
25.	Stoke's Apparatus	2	10,000
26.	Gumther's Apparatus	2	16,000
27.	Resonance Tube Apparatus with accessories and Tuning fork set	2	14,000

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28.	Sodium Lamp setup with Biprism	2	10,000
29.	Ohmic resistance coil	10	5,00
30.	Slide wire bridge	2	8,000
31.	PN Junction diode Apparatus	2	10,000
32.	Laser (as per requirement)	1	1,00,000
33.	Numerical aperture setup	1	25,000
34.	Miscellaneous	LS	3,000
<b>APPLIED CHEMISTRY LABORATORY</b>			
1.	Digital Balance	1	80,000
2.	Burette 50ml	30	3,000
3.	Pipette 25ml	60	4,000
4.	Beakers 100ml	60	4,000
5.	Burette stand	30	30,000
6.	Glazed tile	30	1,000
7.	Conical flask 50ml (Titration flask)	60	4,000
8.	Standard (Measuring) flask (to prepare standard solution) 250ml/100ml	30	6,000
9.	Able's Flash Point apparatus	2	10,000
10.	(1/10)°C thermometer	06	6,000
11.	Candles	20	100
12.	Crucible with lid	06	2,000
13.	Muffle furnace	1	18,000
14.	Decicators	06	8,000
15.	Pair of tongue (small and big)	24 (small) 2 (big)	2,000

Sr. No.	Description	Qty	Total Price (Rs)
16.	Chemicals <ul style="list-style-type: none"> <li>- EDTA-1 kg</li> <li>- Eriochrome Black-T(solochrome black T)-200g</li> <li>- Buffer solution (NH<sub>3</sub> - 2.5 ltr, NH<sub>4</sub>Cl – 1 kg)</li> <li>- Zinc sulphate- 500g</li> <li>- H<sub>2</sub>SO<sub>4</sub>- 2.5 ltr</li> <li>- Phenolphthalein indicator (as per requirement)</li> <li>- Methyl orange indicator (as per requirement)</li> <li>- Charcoal (as per requirement)</li> <li>- Kerosene- 1 ltr</li> </ul>	LS	20,000
17.	Miscellaneous	LS	2,000
<b>ENGINEERING DRAWING</b>			
1.	Drawing Boards (700 x 500mm)	60	25,000
2.	Draughtsman Tables	60	1,80,000
3.	Draughtsman Stools	60	40,000
4.	Computer Aided Drawing (CAD) Software	30 User	5,00,000
5.	Model of different wooder joints	1	1,000
6.	Model of different screw threads	1	1,000
7.	Model of various locking devices	1	1,000
8.	Model of various joints	1	1,000
9.	Cut section Model of various couplings	1	3,000
10.	Miscellaneous	LS	5,000
<b>APPLIED MECHANICS LABORATORY</b>			
1.	Polygon law of forces apparatus	1	2,000
2.	Jib crane	1	4,000
3.	Apparatus for reaction at supports	1	5,000
4.	Inclined plane and friction apparatus	1	2,500
5.	Screw jack	1	1,000
6.	Worm and worm wheel	1	3,500
7.	Single Purchase Winch Crab	1	4,000
8.	Miscellaneous	LS	1,000
<b>BASICS OF IT LABORATORY/COMPUTER LABORATORY</b>			
1.	Computer System with latest configuration	30	8,00,000
2.	Printer (MFP)	1	25,000
3.	Printer (Laser)	1	35,000

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4.	Plotter	1	75,000
5.	Digitiser	1	50,000
6.	Antivirus Software	LS	10,000
7.	Internet Facility on Computers	LS	2,00,000
8.	AutoCAD/Solid Works/Unigraphics/Pro-C (any one software)	30 user	5,00,000
9.	LCD Projector	1	35,000
10.	UPS	60	1,20,000
11.	Software (latest windows, latest MS Office)	1	1,00,000
12.	Scanner	1	10,000
13.	Miscellaneous	LS	5,000
<b>CARPENTRY SHOP</b>			
1	Work benches fitted with carpenter vices	5	20,000
2.	Circular saw grinder	1	6,000
3.	Wood cutting band saw-vertical	1	10,000
4.	Bench grinder	1	5,000
5.	Drilling machine	1	8,000
6.	Wood turning lathe	1	40,000
7.	Wood Planner	1	20,000
8.	Tool accessories measuring and marking Instruments	25	25,000
9.	Band saw blade brazing unit	1	10,000
10.	Miscellaneous	LS	1,500

<b>PAINTING AND POLISHING SHOP</b>			
1.	Spray gun with hose pipe	1	1,000
2.	Paint brushes	20	2,000
3.	Paint/Varnish	LS	2,000
4.	Air Compressor with 2 hp motor	1 set	10,000
5.	Miscellaneous	LS	2,000
<b>ELECTRICAL SHOP</b>			
1.	Tool kit (Plier, Srew driver, Knife, Steel rule, hammer, sciber, pincer steel tape etc.)	20	20,000
2.	Fuses, Switches, Plugs, Sockets, Ceiling rose, Wires, cleats, Clamps, Test lamp, Tester.( as per requirement)		8,000
3.	Electric Iron	1	1,500
4.	Electric kettle	1	1,500
5.	Ceiling fan/table fan	1	2,500
6.	Desert cooler	1	5,000
7.	Lead acid battery	2	8,000
8.	Battery Charger	1	6,000
9.	Miscellaneous		3,000
<b>SMITHY SHOP</b>			
1.	Black smithy forge (with open hearths, accessories to match the forge)	20	40,000
2.	Wrought iron anvils	20	20,000
3.	Swage blocks	4	8,000
4.	Blower with accessories, motor switch etc	1	6,000
5.	Work benches with vices	2	6,000
6.	Power hammer	1	20,000
7.	Tools and accessories – hammers, swages, tongs, pokers, pullers etc	20	10,000



8.	Miscellaneous	LS	1,500
<b>FITTING AND PLUMBING SHOP</b>			
1.	Work benches with vices (4 vices on each bench)	5	30,000
2.	Marking tables with scribers	4	24,000
3.	Surface plates	5	20,000
4.	Accessories like calipers, V blocks, height, gauges steel rules and scribers	25	50,000
5.	Tool kits – taps, dies, drills	25	40,000
6.	Tool kits – chisels, hammers, files, hacksaw	25	25,000
7.	Drilling machine	2	12,000
8.	Pipe vice	4	1,000
9.	Chain wrenches	5	1,250
10.	Ring spanner set	5	600
11.	Pipe die set 2”	2 set	1,000
12.	Pipe bending device	1	5,000
13.	Various plumbing fittings	LS	2,000
14.	Miscellaneous	LS	1,500
<b>SHEET METAL</b>			
1.	Hammers	8	3,000
2.	Mallets (Hard & Soft)	5	2,000
3.	Sheet and wire Ganges	LS	8,00

<b>Sr. No.</b>	<b>Description</b>	<b>Qty</b>	<b>Total Price (Rs)</b>
4.	Shearing Machine	1	20,000
5.	Bar folding Machine	1	20,000
6.	Burring machine	1	10,000
7.	Various sheet (black plain, galvanized iron, corrugated, Aluminium)	1 Each	1,000
8.	Hand Shears/Snippers	4	2,000
9.	Nuts, Bolts, Rivets, Screw	LS	5,00
10.	Miscellaneous	LS	1,000
<b>WELDING SHOP</b>			
1.	Electrical welding transformer set with accessories	3	30,000
2.	Gas Cutting Unit	1	3,000
3.	Work benches with vices	3	5,000
4.	Welding generator set	1	10,000
5.	Oxy acetylene welding set with accessories	1	7,000
6.	Acetylene generating set	1	6,000
7.	Electric welder tool kit	10	10,000
8.	Projection welding machine	1	15,000
9.	Brazing equipment with accessories	1	10,000
10.	Soldering irons	3	1,000
11.	Pedestal grinder	1	10,000

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12.	Metal spraying gun	1	10,000
13.	Spot welder	1	25,000
14.	TIG welding set	1	1,00,000
15.	MIG welding set	1	1,00,000
16.	Welding Partition Screen	5	2,500
17.	Miscellaneous	LS	3,000
<b>FOUNDRY SHOP</b>			
1.	Moulding boxes	40	8,000
2.	Ladles	5	2,000
3.	Tool Kits	10 set	5,000
4.	Quenching tanks	2	5,000
5.	Portable grinder	1	3,000
6.	Pit furnace with blower	1	10,000
7.	Miscellaneous	LS	1,000
<b>MACHINE SHOP</b>			
1.	Centre lathes	10	6,00,000
2.	Grinder	1	10,000
3.	Universal milling machine	1	1,25,000
4.	Shaper	2	1,20,000
5.	Plainer	2	1,20,000
6.	Work bench	3	10,000
7.	Precision instruments	1	10,000
8.	Hand tools and accessories	2	8,000
9.	CNC trainer lathe	1	4,00,000

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10.	Miscellaneous	LS	5,000
<b>ENVIRONMENT ENGINEERING LABORATORY</b>			
1.	pH Meter	01	500
2.	Turbidity Meter	01	5000
3.	Oven with Temperature Controller and Forced Air Circulation Type	01	20000
4.	B.O.D. Incubator	01	25000
5.	Water Analysis Kit	01	5000
6.	High Volume Sampler	01	40000
7.	Electrical Balance for weighing upto 1/10 of milligram (capacity)	01	1000
<b>ENERGY CONSERVATION LABORATORY</b>			
1	Clamp meter	02	5000
2	Multimeter	02	2000
3	Power Analyser	01	20000
4	Different types of lamps (LS) <ul style="list-style-type: none"> <li>- 60 W lamp, 230 V , 100 V</li> <li>- 200 W lamp</li> <li>- 500 W lamp</li> <li>- 100 W lamp, 110 V, 150 V</li> </ul>	10	500
5	Lux meter	02	5000
6	Centrifugal pump, 1 kW	1	15,000
7	Standard window A.C.	01	20000
8	Anemometer	02	5000
9	Thermometer	03	2000
10	Flow meter	02	10000
11	Pumping set with at least two pumps of different capacity.	1 set	10000
12	Pressure gauge fitted on discharge lines	1 set	2000

13	Variable Frequency Drive	02	50000
14	A small compressor with a small network of pipe line fitted with suitable pipeline, pressure gauge, safety valve and loading / unloading pressure switch.	1	3000
15	Stop watch	2	1000
16	Small blower (1.5 kW motor) with inlet and outlet ducts of approximately one meter length on both sides	1	10000
17	Black Box (for checking lamp efficacy including stand and luxmeter)	1	25000

## GENERAL MECHANICAL ENGINEERING LAB

S.No.	Name of Equipment	No.	@ Rs.	Amt.in Rs.
1.	Biogas Plant	1		
2.	Windmill	1		
3.	Experimental Solar Cooker Box Type Instrumented To Measure Temperature its Performance & Temperature At Various Location.	1	500	500
4.	Photo Voltage Solar Cell	1	10000	10000
5.	Throttling & Separating Colorimeter. (Thermal Engg. Lab)	1	10000	10000
6.	Jib Head Key, Flat Key, Saddle Key, Wood Ruff Key, Feather Key Pinkey & A piece of splined shaft.	1 Set	L.S.	500
7.	Pins- Split Pin, Taper Cottor Type Split Pin, Cottor or Cottor Pin, Cottor Bolts; Lewis or Rag Foundation Bolt, Fish Tail & Square Head Foundation Bolts.	1 Set	L.S.	500
8.	Friction Clutches & Couplings-Cone Clutch, Single Plate Muff Coupling, Flange Coupling Universal Coupling or Hooks Joint. Flexible Coupling-Belt & Pin Type, Coil Spring Type.	1 Set	L.S.	2500
9.	Bearings- Plane, Bushed, Split Step, Ball, Rollar Bearings, Thrust Bearings.	1 Set	L.S.	1000
10.	Spur gear Single & Double Helical Gears, Bevel Gears.	1 Set	L.S.	1000
11.	Simple Spur Gear train	1	1500	1500
12.	Compound Gear Train	1	1500	1500
13.	Epicyclic Gear Train	1	2000	2000
14.	Compression & Tension Each Helical Springs.	1	200	200
15.	Four Bar Mechanism Fitted on a board.	1	1000	1000
16.	Slider Crank Mechanism	1	1000	1000
17.	Whitworth Quick Return Mechanism Fitted on a board.	1	1000	1000

## ELECTRICAL TECHNOLOGY & ELCETRONICS LAB

S.No	Name of Equipment	No.	@ Rs.	Amt.in Rs.
1.	D.C. Shunt Motor 3 Kw. 1500 RPM with 3 Point Starter	2	10000	20000
2.	D.C. Compound Motor 3 Kw. 1500 RPM	2	10000	20000
3.	Single Phase Transformer 1 KVA 50 Hz. Primary Voltage 230 with tapping at 50%, 86.6 % Facility	2	6000	12000
4.	3 Phase Induction Motor 415 V., 50 Hz, 440 RPM, 3 KVA Star/Delta/Autotransformer Starter	2	5000	10000
5.	Loading Drum Spring Balance & Belt Arrangement.	2 Set	1000	2000
6.	Tachometer (Analog/Digital)	1	2000	2000
7.	3 Phase Inductive Loading of Variable Nature	1	8000	8000
8.	Single Phase Inductive Loading Variable 0-10 Amp., 50 Hz.	1	8000	8000
9.	Moving Coil Ammeter 0-10 Amp.	8	1000	1000
10.	Moving Coil Voltmeter 0-300 V.	8	1000	8000
11.	Moving Iron Ammeter 0-10 Amp.	8	1000	8000
12.	Moving Iron Voltmeter 0-300 V.	8	1000	8000
13.	Wattmeter Single Phase Dynamo Type 75/300/600 V. 2.5/5 Amp.	4	2500	10000
14.	Three Phase Variable Inductive Loading.	1	8000	8000
15.	Single Phase Variable Inductive Loading with Rheostat	1	8000	8000
16.	Megger 0-20 Mega Ohm, 500 RPM	1	8000	8000
17.	Flouroscent Tube With Choke.	1	100	100
18.	SCR Bread Board	1	1000	1000
19.	Power Supply 230 V.	1	1000	1000
20.	Moving Coil Ammeter 0-500 M.A.	1	1000	1000
21.	Moving Coil Voltmeter 0-250 V.	1	1000	1000
22.	Energy Meter Single Phase 230 V., 5 Amp	1	2000	2000
	Misc.		LS	1500

### TEXTILE TESTING LAB

S.No	Name of Equipment	No.	@Rs.	Amt.in Rs.
1.	Baer Sorter (For Fibre Length) Acrylic Transparent Sheet - 6"X8"X2 pices, 3"X8"X2 pcs Fibre Mounting Templest 6"X8"X2 pices, 3"X8"X2 pcs with tweezers, velvet pad, scales, planchass with all complete accessories or Latest Configuration	2	35000	35000
2.	MicroscopeDigital Mocoscope - Microscope & Ends Counting Equipments-Magnifying Power 5X,10X,20X,40X,100X lenses Trinocular biological microscope with fibre cross section kit, high resolution CCD camera and imaging software with measurement facilities, Scope of use section of fibre or yarn, analysis of any fibre, yarn and fibre Range : 5X,10X,20X,450X,100X / as per requirements, Focus : Adjustable, Lights - White, Blue, Yellow, Upper & Lower, Supply -220 V AC supply Single Phase with all complete accessories Or Latest Configuration	2	65000	65000
3.	Moisture Meter	1	16000	16000
4.	Wrap reel	2	40000	80000
5.	Wrap Block	2	9500	19000
6.	Beesley Balance	4	7000	28000
7.	Quadrant Balance	2	6000	12000
8.	Lea Strength Tester	1	75000	75000
9.	Single Thread Tester (Digital)	1	100000	100000
10.	R. B. Twist Tester	2	45000	90000
11.	One Inch Twist Tester	2	9800	19600



12.	<p>Take Up Twist Tester  Yarn test length : 25 mm to 500 mm adjustable (Metric unit) Or 1" to 20" Maximum adjustable (imperial unit), The test length is automatically taken into account for calculation and final reading is displayed directly in TPM/TPL</p> <p>Range :Upto 60TPL</p> <p>Resolution :1 TPM or 0.01 TPI</p> <p>Motor Speed: Upto 1500 RPM</p> <p>Clamps : Spring loaded clamps at motor end for easy clamping of Yarn</p> <p>Averaging : Reading of at least 10 samples can be stored and average TPM/TPI value is calculated and digital display with pre set device.</p> <p>Supply : 220 V AC, single phase Suitable for S/Z type of twisted yarn with reset device. Tension weight upto 100 gm adjustable.</p> <p>Yarn spool mounting arrangement at one end of the twist tester with all complete accessories or Latest Configuration</p>	2	28500	57000
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13.	Fabric Strength Tester (Tensile Strength)	1	80000	80000
14.	Tearing Strength Tester	1	35000	35000
15.	Bursting Strength Tester	1	35000	35000
16.	Abrasion Resistance Tester(Martindle Type)	1	75000	75000
17.	Laundrometer (For washing fastness testing)	1	80000	80000
18.	Crocko Meter	1	10000	10000
19.	Digital Fibrograph Measuring Principle- Optical Measuring Range-12.0 to 45.0 mm Measuring Accuracy - +/- 0.1 mm Result Output-2.5% SL,50% SL & UR % Front End Language-English Applicable Standard-ASTM D5332,ISO2648 & IS233 Power Supply-Single Phase 220V AC	1	320000	320000
20.	Uster Evenness Tester	1	2000000	2000000
21.	Trash Analyser	1	150000	150000
22.	Conditioning Oven 220 V With capability of maintaining temperature up to 100oC and facility for smoth variation of temperature inside 27 liter.	1	98500	98500
23.	Stelometer (For bundle Strength)	2	150000	300000
24.	Crease Recovery Tester Size of the Test Specimen - 40mm X 15mm, Crease Load : 1Kg.(Stainless Steel), Angle measurement : On an Engraved circular scale graduated in 1 deg., Scale measurement : 0-180 with all complete accessories or Latest Configuration	2	15000	30000
25.	Water Repellency Tester	1	80000	80000
26.	Pilling Tester	1	30000	30000

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27.	Crimp Rigidity Tester Minor Load - 2 Gr. to 10Gr. in a step of one grams Major Load - 100 Gr. to 500 Gr. in step of 50 Grams Digital display 220 V, with all complete accessories or Latest Configuration	1	20000	20000
28.	Air Permeability Tester	1	60000	60000
29.	Sheffield Micronaire with compressor (For Fibre Fineness)	1	150000	150000
31.	Miscellaneous Items-Thermometers, Thermo hydrograph, Whirling Hydrometer, Dry & Wet bulb thermometer, Physical Balance, 1.5 ton Air conditioner for atmosphere control etc.			
32.	Classimate (Yarn faults finding equipment)	1		1200000
34.	Sublimation fastness tester	1	100000	100000
35.	Round Sample of GSM with Electronic balance	1	20000	20000
36.	Stiffness Tester	1	15000	15000
37.	Drape meter	1	25000	25000
38.	Fabric Thickness Tester	1	8000	8000
39.	A.S.T.M. Cards For Threads/Inch	1		

**NOTE:**

1. Item No. 17,18,25 and 26 are not required for Textile Technology course.
2. Indian make working laboratory models for costly equipment be purchased if available.

**SPINNING LAB**

S.No.	Name of Equipment	No.	@ Rs.	Amt.in Rs.
1.	Blow Room Line With Six Beating Points (Lab Model) Latest Lab Model of blaow room line of 10 inch width or more complete with hopper feeder, Scutcher, beaters with adjustment grid bars, latic, Krischner neater, Feed regulatory system, calendar rollers, lap rollers, lap tray with electric control pannel, beating point = 4.5 to 6 with complete accessories or Latest Configuration	1	5000000	5000000
2.	Model of mini carding plant 250 mm working width 250 mm cylinder, doffer, feed roller, opening roller, striping roller, crush roller	1No.	800000	800000

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	stainless undercasing, takeup drum suitable for feeding, miniature draw frame with gear and pulleys to drive feed roller, cylinder and doffer and other accessories, Mechanical type possibility of processing 50 gms. per batch 10 "width, metallic wire clothing with complete accessories, Microprocessor based individual drive or Latest Configuration			
3.	Draw Frame : Having 3 over 3 drafting arrangement to process the silver from miniature carding machine with individual AC variable speed motors with change gears to vary the speeds of front roller, middle and back roller for different Total Draft and break Draft inclusive of motor, rpm indicators control system and other accessories Mechanical type single delivery, 3 over 3 drafting arrangement, range 5-15 Draft Microprocessor based or Latest Configuration	1No.	800000	8,00,000
4.	High Speed Simplex (Lab Model) Latest Lab Model Range :6-12 Spindle Suitable for 110 mm dia package Draft Range=6-18, 3 roller apron drafting arrangement SKF PK 1500, individual AC variable speed motors with control system with automatic stop motion, Inching mechanism, 100 empty PP bobbins with complete accessories and pinion according to draft change with all complete accessories or Latest Configuration	1	480000	480000
5.	Ring Frame Ring Spinning Frame : No. of Spindle 6-12, mechanical speed 25000 rpm, ring dia - 38 mm, 70mm gauge, 180 mm lift, SKF PK 2025/2035, 3 over 3 drafting arrangement with short cradles, for gearing arrangement to change the total draft, Break draft and TPI with change gears and other accessories. Mechanical draft 10-50 Microprocessor based or Latest Configuration	1	850000	850000
6.	Sliver Lap Machine	1	250000	250000
7.	Ribbon Lap Machine	1	250000	250000
8.	Comber 6/8 Heads	1	800000	800000
9.	Parallel Winding Machine(24 Drums) (Lab Model) Cheese winding :Range 4-8 or more drum, Speed Range-600-800 y.p.m., Optical cleaner on individual spindle, Steel drum/ Bakelite drum as per parallel winding, 220V, Single phase motor, 100pp cheeses with all complete accessories or latest configuration	1	400000	400000
10.	Yarn Doubling Machine (Lab Model)	1	275000	275000

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11.	Hank Reeling Machine	1	25000	25000
12.	Two For One Twister(T.F.O.) TFO type, No. of spindle= range 4-8, 230 mm guage, 150 mm pot dia, suitable for cheese of 170 mm traverse, twist range=3.0 to 45.0, count range 2/8's to 2/80's Ne, Tangential belt drive for S & Z twist both, with automatic shop motorn and other complete accessories, 100 PP empty package with all complete accessories or Latest Configuration	1	600000	600000
13.	Stripping Roller (For Card)	1	5000	5000
14.	Grinding Roller (Transverse wheel Grinder)	1	5000	5000
15.	Metallic Wire Mounting Equipment (With Butt Welder)	1	20000	20000
17.	Assembly Winder	1	250000	250000
18.	Open end spinning M/c of Twelve rotors (Lab Model) Having Range 4-8 head rotor guage-230 mm having 48 mm rotor with OK39/40 opening rollers, automatic stop motion R4/10 navels, built in automatic indicators and quick response sensors to monitor yarn continuity and sliver, trash separator and discharge tunel for better cleaning, Feeding can size of 14" X 42" and take up package cone and cheese both with individual motors with pully to change draft and twist with motors. Electrical PLC system, Computer, UPS, Control system, Dreft range suitable for 2' to 24's and other all complete accessories, draft range-50-200 user friendly menu driven software or Latest Configuration	1	750000	750000

**NOTE:**

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

### WEAVING LAB

S.No.	Name of Equipment	No.	@ Rs.	Amt.in Rs.
1.	Warp Winding Machines			
	A. Ordinary Machine with 10 Heads	1	75000	75000
	B. Automatic Winding Machine with 10 Heads	1	800000	800000
2.	Pirn Winding Machine with 4 Heads	1	75000	75000
3.	Warping Machines			
	A. Beam Warping Machine (High Speed)	1	300000	300000
	B. Sectional Warping Machine	1	175000	175000
4.	Working Model of Sizing Plant	1	500000	500000
5.	Drawing and Denting Frames (cap. 200 ends) Stainless Screen Frame, Capacity 3200 ends with all Complete Accessories or Latest Configuration.	2	10000	20000
6.	Beam Knotting Machine	1	80000	80000
7.	Plane Looms			
	A. Plain Loom For Plain Tappet	1	70000	70000
	B. Plain Loom For Other Weave Tappets	1	100000	100000
8.	Dobby Looms			
	A. Single (Acting) Dobby Loom	1	200000	200000
	B. Double Acting (Double Lift) Dobby Loom	1	200000	200000
9.	Jacquard Looms			
	A. Loom with Single Lift Single Cylinder Jacquard	1	250000	250000
	B. Loom With Single Lift Double Cylinder Jacquard	1	250000	250000
	C. Loom With Double Lift Double Cylinder Jacquard	1	250000	250000
10.	Automatic Weaving Machines			
	A. Automatic Pirn Changing Loom	1	300000	300000
	B. Automatic Shuttle Changing Loom	1	300000	300000
11.	Shuttleless Weaving Machines			
	A. Gripper Type Shuttleless Loom	1	3500000	3500000
	B. Air Jet Weaving Machine	1	1200000	1200000
	C. Water Jet Weaving Machine	1	1200000	1200000
12.	Other Weaving Machines			
	A. Hand Looms	2	40000	80000
	B. Loom With Circular Multiple Box Motion.	1	150000	150000
	C. Loom With Drop Box Multiple Box	1	150000	150000
	D. Loom With Terry Motion	1	200000	200000
	E. Loom With Pick At Will Motion	1	150000	150000
13.	Card Cutting Machine	1	40000	40000
14.	Knitting Machines			
	A. Flat Knitting Machine	1	75000	75000
	B. Circular Knitting Machine	1	125000	125000
15.	Sewing Machine	6	10000	60000
16.	Model of Rapier Looms 20" with winding and warping unit complete set	1	3000000	3000000

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**NOTE:**

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

## **11. EVALUATION STRATEGY**

### **11.1 INTRODUCTION**

Evaluation plays an important role in the teaching-learning process. The major objective of any teaching-learning endeavor is to ensure the quality of the product which can be assessed through learner's evaluation.

The purpose of student evaluation is to determine the extent to which the general and the specific objectives of curriculum have been achieved. Student evaluation is also important from the point of view of ascertaining the quality of instructional processes and to get feedback for curriculum improvement. It helps the teachers in determining the level of appropriateness of teaching experiences provided to learners to meet their individual and professional needs. Evaluation also helps in diagnosing learning difficulties of the students. Evaluation is of two types: Formative and Summative (Internal and External Evaluation)

#### **Formative Evaluation**

It is an on-going evaluation process. Its purpose is to provide continuous and comprehensive feedback to students and teachers concerning teaching-learning process. It provides corrective steps to be taken to account for curricular as well as co-curricular aspects.

#### **Summative Evaluation**

It is carried out at the end of a unit of instruction like topic, subject, semester or year. The main purpose of summative evaluation is to measure achievement for assigning course grades, certification of students and ascertaining accountability of instructional process. The student evaluation has to be done in a comprehensive and systematic manner since any mistake or lacuna is likely to affect the future of students.

In the present educational scenario in India, where summative evaluation plays an important role in educational process, there is a need to improve the standard of summative evaluation with a view to bring validity and reliability in the end-term examination system for achieving objectivity and efficiency in evaluation.

### **11.2 STUDENTS' EVALUATION AREAS**

The student evaluation is carried out for the following areas:

- Theory
- Practical Work (Laboratory, Workshop, Field Exercises)
- Project Work

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## A. Theory

Evaluation in theory aims at assessing students' understanding of concepts, principles and procedures related to a course/subject, and their ability to apply learnt principles and solve problems. The formative evaluation for theory subjects may be caused through sessional /class-tests, home-assignments, tutorial-work, seminars, and group discussions etc. For end-term evaluation of theory, the question paper may comprise of three sections.

### Section-I

It should contain objective type items e.g. multiple choice, matching and completion type. Total weightage to Section-1 should be of the order of 20 percent of the total marks and no choice should be given in this section. The objective type items should be used to evaluate students' performance in knowledge, comprehension and at the most application domains only.

### Section-II

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

### Section-III

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

*Table II : Suggested Weightage to be given to different ability levels*

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

## B. Practical Work

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Evaluation of students performance in practical work (Laboratory experiments, Workshop practicals/field exercises) aims at assessing students ability to apply or practice learnt concepts, principles and procedures, manipulative skills, ability to observe and record, ability to interpret and draw conclusions and work related attitudes. Formative and summative evaluation may comprise of weightages to performance on task, quality of product, general behaviour and it should be followed by viva-voce.

**C. Project Work**

The purpose of evaluation of project work is to assess students ability to apply, in an integrated manner, learnt knowledge and skills in solving real life problems, manipulative skills, ability to observe, record, creativity and communication skills. The formative and summative evaluation may comprise of weightage to nature of project, quality of product, quality of report and quality of presentation followed by viva-voce.

**D. Professional Industrial Training**

Evaluation of professional industrial training report and viva-voce/ presentation aims at assessing students' understanding of materials, 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. The formative and summative evaluation may comprise of weightages to performance in testing, general behaviour, quality of report and presentation during viva-voce.

## **12. RECOMMENDATIONS FOR EFFECTIVE CURRICULUM IMPLEMENTATION**

This curriculum document is a Plan of Action and has been prepared based on exhaustive exercise of curriculum planning and design. The representative sample comprising selected senior personnel (lecturers and HODs) from various institutions and experts from industry/field have been involved in curriculum design process.

The document so prepared is now ready for its implementation. It is the faculty of polytechnics who have to play a vital role in planning instructional experiences for the courses in four different environments viz. class-room, laboratory, library and field and execute them in right perspective. It is emphasized that a proper mix of different teaching methods in all these places of instruction only can bring the changes in stipulated students behaviour as in the curriculum document. It is important for the teachers to understand curriculum document holistically and further be aware of intricacies of teaching-learning process (T-L) for achieving curriculum objectives. Given below are certain suggestions which may help the teachers in planning and designing learning experiences effectively. These are indicative in nature and teachers using their creativity can further develop/refine them. The designers of the programme suggest every teacher to read them carefully, comprehend and start using them.

### **(A) Broad Suggestions:**

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 and made available to all polytechnics well in advance. The Principals have a great role to play in its dissemination and, percolation upto grass-root level. Polytechnics, in turn are supposed to prepare institutional academic plan.
3. HOD of every Programme Department along with HODs and incharges of other departments are required to prepare academic plan at department level referring to institutional academic plan.
4. All lecturers/Senior lecturers are required to prepare course level and class level lesson plans referring departmental academic plan.

### **(B) Course Level Suggestions**

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.

Polytechnic teachers are required to plan various instructional experiences viz. theory lecture, expert lectures, lab/workshop practicals, guided library exercises, field visits, study tours, camps etc. In addition, they have to carry out progressive assessment of theory, assignments, library, practicals and field experiences. Teachers are also required to do all these activities within a stipulated period of time. It is essential for them to use the given time judiciously by planning all above activities properly and ensure execution of the plan effectively.

Following is the gist of suggestions for subject teachers to carry out T-L process effectively:

1. Teachers are required to prepare a course plan, taking into account departmental academic plan, number of weeks available and courses to be taught.
2. 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. They may follow steps for preparing lesson plan e.g. drawing attention, state instructional objectives, help in recalling pre-requisite knowledge, deliver planned subject content, check desired learning outcomes and reinforce learning etc.
3. Teachers are required to plan for expert lectures from field/industry. Necessary steps are to plan in advance, identify field experts, make correspondence to invite them, take necessary budgetary approval etc.
4. 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.
5. Concept and content based field visits may be planned and executed for such content of course which is abstract in nature and no other requisite resources are readily available in institute to impart them effectively.
6. There is a dire need for planning practical experiences in right perspective. These slots in a course are the avenues to use problem based learning/activity learning/experiential learning approach effectively. The development of lab instruction sheets for the course is a good beginning to provide lab experiences effectively.
7. Planning of progressive assessment encompasses periodical assessment in a semester, preparation of proper quality question paper, assessment of answer sheets immediately and giving constructive feedback to every student.
8. The student centred activities may be used to develop generic skills like task management, problem solving, managing self, collaborating with others etc.

9. Where ever possible, it is essential to use activity based learning rather than relying on delivery based conventional teaching all the time.
10. Teachers may take initiative in establishing liaison with industries and field organizations for imparting field experiences to their students.
11. Students be made aware about issues related to ecology and environment, safety, concern for wastage of energy and other resources etc.
12. Students may be given relevant and well thought out project assignments, which are purposeful and develop practical skills. This will help students in developing creativity and confidence for their gainful employment.
13. A Project bank may be developed by the concerned department of the polytechnics in consultation with related Industry, research institutes and other relevant field organizations in the state.

### 13. LIST OF PARTICIPANTS

List of experts who contributed in the development of the curriculum in Review and Revision for the Three year (Six Semester) Diploma Textile Engineering (First and Second Semester) at I.R.D.T., U.P., Kanpur on 24 & 25 August 2022 are honorable named below :

- 1- Shri B. D. Dixit Retd. Professor, U.P.T.T.I., Kanpur
- 2- Dr. Alka Ali Professor, U.P.T.T.I., Kanpur
- 3- Dr. Prashant Visnoi Professor, U.P.T.T.I., Kanpur
- 4- Shri Arun Kumar Gangwar Associate Professor, U.P.T.T.I., Kanpur
- 5- Shri Sanjeev Kumar Rajput Associate Professor, U.P.T.T.I., Kanpur
- 6- Shri R. K. Srivastava Deputy Director D.T.E., U.P. Kanpur
- 7- Shri D.K. Verma Professor, I.R.D.T. Kanpur
- 8- Shri Pankaj Yadav Assistant Director D.T.E., U.P. Kanpur
- 9- Shri R. K. Gupta H.O.D./Principal, Govt. Poly., HindalpurHapur
- 10- Shri Sambhaskar Singh Assistant Professor, I.R.D.T., Kanpur
- 11- Smt. Anubha Gupta Lecturer, G. P., Kanpur
- 12- Smt. Anjali Patel Lecturer, G. P., Kanpur
- 13- Shri Pravesh Verma Assistant Professor, I.R.D.T., Kanpur  
(Course Co-ordinator)

### LIST OF EXPERTS

List of experts who contributed in the development of the curriculum in Semester System for the Three year (Six Semester) Diploma in Textile Engineering (Third, Fourth, Fifth and Six Semester) at I.R.D.T., U.P., Kanpur on 07.06.2023 & 08.06.2023 are honorable named below :.

1. Prof. Alka Ali Retired Professor, U.P.T.T.I., Kanpur
2. Dr Prasant Vishnoi Professor, U.P.T.T.I., Kanpur
3. Shri Arun Kumar Gangwar Associate Professor, U.P.T.T.I., Kanpur
4. Shri Sanjeev Kumar Rajput Associate Professor, U.P.T.T.I., Kanpur
- 5.. Shri D.K. Verma Professor, I.R.D.T. Kanpur
6. Brajesh Mishra Lecturer Textile Chemistry G. P. hindalpur hapur
7. Anjali Patel Lecturer Textile Chemistry G. P. kanpur
8. Rahul Kumar Shringirishi Guest Lecturer Textile Chemistry G.P. Kanpur
9. Santosh Kumar Lecturer Textile Technology G. P. Mau.
10. Palash Kumar Patra Lecturer Textile Technology G.P. Kuru Pindara  
varanasi
11. Smt. Anubha Gupta Lecturer Textile Technology, G. P., Kanpur
12. Shri Pravesh Verma Assistant Professor, I.R.D.T., Kanpur  
(Course Co-ordinator)