ANNA UNIVERSITY, CHENNAI

UNIVERSITY DEPARTMENTS

B.TECH APPAREL TECHNOLOGY

REGULATIONS – 2015

CHOICE BASED CREDIT SYSTEM

Program Educational Objectives: (PEOs)

Bachelor of Apparel Technology curriculum is designed to prepare the graduates having attitude and knowledge to

I. Have successful professional and technical career
II. Have strong foundation in basic sciences, mathematics and management
III. Have knowledge on the theory and practices in the field of Apparel Technology and allied areas
IV. Engross in life-long learning to keep themselves abreast of new developments
V. Practice and inspire high ethical values and technical standards

Program Outcome: (POs)

1. Ability to apply knowledge of mathematics, sciences and Technology
2. Ability to apply knowledge on basics of yarn, fabric manufacture, chemical processing and testing of textiles in garment manufacture
3. Ability to understand and apply basic pattern engineering concepts, merchandising and marketing, sewing production, woven and knitted fabric design skills
4. Ability to identify and solve technological problems in Garment Industry
5. Ability to analyze and apply knowledge in the field of design and production of apparels and ability to understand and apply computational platforms and software tools for pattern making and marker planning applications
6. Ability to understand ethical and professional responsibilities
7. Ability to communicate effectively and work in interdisciplinary groups
8. Ability to review, comprehend and report technological development

Attested

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Anna University, Chennai-600 025.

Mapping of Programme Educational Objective with Programme Outcomes

Programme Educational Objectives	Programme Outcomes							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
I	✓	✓		✓	✓			
II	✓		✓		✓		✓	
III		✓	✓	✓	✓			✓
IV				✓	✓			✓
V						✓	✓	

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S. No.	Course Title	Programme Outcomes							
HUMANITIES AND SOCIAL SCIENCES (HS)		1	2	3	4	5	6	7	8
1	Foundational English						✓	✓	✓
2	Technical English						✓	✓	✓
3	Employability Skills	✓					✓	✓	✓
BASIC SCIENCES (BS)		1	2	3	4	5	6	7	8
1	Mathematics – I	✓				✓			
2	Engineering Physics	✓	✓	✓					
3	Engineering Chemistry	✓	✓		✓				
4	Basic sciences Laboratory	✓	✓						
5	Mathematics – II	✓				✓			
6	Physics of Materials	✓	✓	✓					
7	Chemistry for Technologists	✓	✓		✓				
8	Applied Chemistry Laboratory	✓	✓		✓				
9	Probability and Statistics	✓				✓			
ENGINEERING SCIENCES (ES)		1	2	3	4	5	6	7	8
1	Engineering Graphics	✓		✓		✓			
2	Engineering Practices Laboratory	✓							
3	Engineering Mechanics	✓	✓						
4	Computing Techniques	✓				✓			
5	Computer Practices Laboratory	✓				✓			
6	Principles of Electrical and Electronics Engineering	✓			✓				
7	Electrical and Electronics Laboratory.	✓			✓				
8	Solid Mechanics for Technologists	✓	✓						
9	Environmental science and engineering						✓		
PROFESSIONAL CORE (PC)		1	2	3	4	5	6	7	8
1	Technology of Fabric Formation		✓	✓	✓				
2	Technology of Spinning Process		✓						
3	Characteristics of Textile Fibres		✓	✓	✓				
4	Basics of Apparel Technology		✓	✓	✓	✓			
5	Textile Manufacture Laboratory		✓	✓	✓				
6	Garment Construction			✓	✓	✓			
7	Pattern Engineering I			✓	✓	✓			
8	Basics of Knitting Technology			✓	✓				
9	Textile Chemical Processing I			✓	✓				
10	Woven fabric Structure		✓	✓	✓				

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11	Pattern Making Laboratory			✓	✓	✓			
12	Fabric Analysis Laboratory			✓	✓	✓			
13	Apparel Production Machinery			✓	✓	✓			
14	Pattern Engineering II			✓	✓	✓			
15	Textile Chemical Processing II		✓	✓	✓			✓	
16	Textile Chemical Processing Laboratory		✓	✓	✓			✓	
17	Garment Construction Laboratory			✓	✓	✓			
18	Industrial Engineering in Apparel Industry			✓	✓	✓	✓		
19	Fabric Quality Evaluation Laboratory		✓	✓	✓	✓			
20	Financial Management for Textile and Apparel Industries				✓		✓	✓	✓
21	Fashion Design Laboratory			✓	✓	✓			
22	Fabric Quality Evaluation		✓	✓	✓				
23	Apparel Production Planning and Process Control			✓	✓				
24	Apparel Marketing and Merchandizing			✓	✓			✓	
25	Retail management and Visual Merchandizing			✓	✓			✓	
26	Apparel Costing			✓	✓			✓	
27	Computer Aided Garment Design				✓	✓		✓	
EMPLOYABILITY ENHANCEMENT COURSES (EEC)		1	2	3	4	5	6	7	8
1	Technical Seminar							✓	✓
2	Industrial Training*					✓	✓	✓	✓
3	Basic Sewing Laboratory					✓		✓	
4	Project work			✓		✓	✓	✓	✓
PROFESSIONAL ELECTIVES (PE)		1	2	3	4	5	6	7	8
1.	Apparel Accessories and Embellishments			✓	✓			✓	
2.	Production and Application of Sewing Threads		✓	✓	✓				
3.	Protective Textiles		✓	✓	✓	✓			✓
4.	Operations Research for Textile Industry				✓	✓		✓	
5.	Total Quality Management for Textile Industry				✓		✓	✓	
6.	Clothing Comfort		✓	✓	✓	✓			
7.	Brand Management			✓	✓		✓	✓	
8.	Home Textiles		✓	✓	✓		✓		
9.	Intimate Apparels		✓	✓	✓		✓		
10.	Quality Evaluation of Fibres and Yarns		✓	✓	✓				
11.	Smart Textiles		✓	✓	✓	✓			
12.	Engineering Ethics and Human Values						✓	✓	
13.	Colour Science		✓	✓	✓				
14.	Human Resource Management				✓		✓		✓
15.	Production and Operation Management				✓		✓		

16.	Supply Chain Management for Textile Industry				✓			✓	✓
17.	Textile and Apparel EXIM Management				✓		✓	✓	✓
18.	Technology of Bonded Fabrics		✓	✓	✓	✓			
19.	Disaster Management						✓	✓	
20.	Human Rights						✓	✓	✓
21.	Knit Wear Development		✓	✓	✓	✓			
22.	Denim Manufacturing		✓	✓	✓	✓			

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CURRICULA AND SYLLABI I – VIII SEMESTERS

SEMESTER I

S.No	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	HS7151	Foundational English	HS	4	4	0	0	4
2.	MA7151	Mathematics - I	BS	4	4	0	0	4
3.	PH7151	Engineering Physics	BS	3	3	0	0	3
4.	CY7151	Engineering Chemistry	BS	3	3	0	0	3
5.	GE7152	Engineering Graphics	ES	5	3	2	0	4
PRACTICALS								
6.	BS7161	Basic Science Laboratory	BS	4	0	0	4	2
7.	GE7162	Engineering Practice Laboratory	ES	4	0	0	4	2
			TOTAL	**27**	**21**	**2**	**8**	**22**

SEMESTER II

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	HS7251	Technical English	HS	4	4	0	0	4
2.	MA7251	Mathematics II	BS	4	4	0	0	4
3.	PH7257	Physics of Materials	BS	3	3	0	0	3
4.	CY7255	Chemistry for Technologists	BS	3	3	0	0	3
5.	GE7153	Engineering Mechanics	ES	4	4	0	0	4
6.	GE7151	Computing Techniques	ES	3	3	0	0	3
PRACTICALS								
7.	CY7261	Applied Chemistry Lab	BS	4	0	0	4	2
8.	GE7161	Computer Practice Lab	ES	4	0	0	4	2
			TOTAL	**29**	**21**	**0**	**8**	**25**

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SEMESTER III

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	AT7301	Fundamentals of Garment Manufacturing	PC	2	2	0	0	2
2.	AT7302	Technology of Fabric Formation	PC	3	3	0	0	3
3.	AT7303	Technology of Spinning Processes	PC	4	4	0	0	4
4.	EE7254	Principles of Electrical and Electronics Engineering	ES	3	3	0	0	3
5.	MA7357	Probability and Statistics	BS	4	4	0	0	4
6.	TT7351	Characteristics of Textile Fibres	PC	4	4	0	0	4
PRACTICALS								
7.	AT7311	Basic Sewing Laboratory	EEC	2	0	0	2	1
8.	AT7312	Textile Manufacturing Laboratory	PC	2	0	0	2	1
9.	EE7261	Electrical and Electronics Engineering Laboratory	ES	4	0	0	4	2
			TOTAL	**28**	**20**	**0**	**8**	**24**

SEMESTER IV

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	AT7401	Garment Construction	PC	3	3	0	0	3
2.	AT7402	Knit Fabric Production	PC	2	2	0	0	2
3.	AT7403	Textile Chemical Processing I	PC	3	3	0	0	3
4.	AT7451	Introduction to Pattern Engineering	PC	3	3	0	0	3
5.	CH7351	Solid Mechanics for Technologists	ES	3	3	0	0	3
6.	TT7451	Woven Fabric Structure	PC	3	3	0	0	3
PRACTICALS								
7.	AT7411	Pattern Making Laboratory	PC	4	0	0	4	2
8.	TT7461	Fabric Analysis Laboratory	PC	4	0	0	4	2
			TOTAL	**25**	**17**	**0**	**8**	**21**

SEMESTER V

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	AT7501	Textile Chemical Processing II	PC	3	3	0	0	3
2.	AT7551	Advanced Pattern Engineering	PC	3	3	0	0	3
3.	AT7552	Garment Production Machinery	PC	3	3	0	0	3
4.	GE7251	Environmental Science and Engineering	HS	3	3	0	0	3
5.		Professional Elective I	PE	3	3	0	0	3
6.		Professional Elective II	PE	3	3	0	0	3
PRACTICALS								
7.	AT7511	Garment Construction Laboratory	PC	4	0	0	4	2
8.	TT7561	Textile Chemical processing Laboratory	PC	4	0	0	4	2
			TOTAL	**26**	**18**	**0**	**8**	**22**

SEMESTER VI

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	AT7651	Industrial Engineering in Apparel Industry	PC	3	3	0	0	3
2.	HS7551	Employability skills	HS	3	3	0	0	3
3.	TT7651	Fabric Quality Evaluation	PC	3	3	0	0	3
4.	TT7652	Financial Management for Textile and Apparel Industries	PC	3	3	0	0	3
5.		Professional Elective III	PE	3	3	0	0	3
6.		Open Elective I	OE	3	3	0	0	3
PRACTICALS								
7.	AT7611	Fashion Design Laboratory	PC	2	0	0	2	1
8.	TT7661	Fabric Quality Evaluation Laboratory	PC	2	0	0	2	1
			TOTAL	**22**	**18**	**0**	**4**	**20**

SEMESTER VII

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.	AT7701	Apparel Costing	PC	2	2	0	0	2
2.	AT7702	Apparel Production Planning and Process Control	PC	3	3	0	0	3
3.	AT7703	Retail Management and Visual Merchandising	PC	3	3	0	0	3
4.	AT7751	Apparel Marketing and Merchandising	PC	3	3	0	0	3
5.		Professional Elective IV	PE	3	3	0	0	3
6.		Open Elective II	OE	3	3	0	0	3
PRACTICALS								
7.	AT7711	Computer Aided Garment Design Laboratory	PC	4	0	0	4	2
8.	AT7712	Industrial Training	EEC	0	0	0	0	3
9.	AT7713	Technical Seminar	EEC	4	0	0	4	2
			TOTAL	**25**	**17**	**0**	**8**	**24**

SEMESTER VIII

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY								
1.		Professional Elective V	PE	3	3	0	0	3
2.		Professional Elective VI	PE	3	3	0	0	3
PRACTICALS								
3.	AT7811	Project work	EEC	20	0	0	20	10
			TOTAL	**26**	**6**	**0**	**20**	**16**

TOTAL NO. OF CREDITS: 174

PROFESSIONAL ELECTIVES (PE)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	AT7001	Apparel Accessories and Embellishments	PE	3	3	0	0	3
2.	AT7002	Brand Management	PE	3	3	0	0	3
3.	AT7003	Denim Manufacturing	PE	3	3	0	0	3
4.	AT7004	Home Textiles	PE	3	3	0	0	3
5.	AT7005	Intimate Apparels	PE	3	3	0	0	3
6.	AT7006	Knit Wear Development	PE	3	3	0	0	3
7.	AT7007	Production and Operations Management	PE	3	3	0	0	3

8.	AT7071	Production and Application of Sewing Threads	PE	3	3	0	0	3
9.	AT7072	Protective Textiles	PE	3	3	0	0	3
10.	AT7073	Smart Textiles	PE	3	3	0	0	3
11.	GE7071	Disaster Management	PE	3	3	0	0	3
12.	GE7074	Human Rights	PE	3	3	0	0	3
13.	GE7351	Engineering Ethics and Human Values	PE	3	3	0	0	3
14.	TT7011	Human Resources Management	PE	3	3	0	0	3
15.	TT7012	Quality Evaluation of Fibers and Yarns	PE	3	3	0	0	3
16.	TT7071	Clothing Comfort	PE	3	3	0	0	3
17.	TT7072	Color Science	PE	3	3	0	0	3
18.	TT7073	Operations Research for Textile Industry	PE	3	3	0	0	3
19.	TT7074	Supply Chain Management for Textile Industry	PE	3	3	0	0	3
20.	TT7075	Textile and Apparel EXIM Management	PE	3	3	0	0	3
21.	TT7076	Total Quality Management for Textile Industry	PE	3	3	0	0	3
22.	TT7551	Technology of Bonded Fabrics	PE	3	3	0	0	3
23.	GE7072	Foundation Skills in Integrated Product Development	PE	3	3	0	0	3
24.	AT7008	ERP for Apparel Industry	PE	3	3	0	0	3

HUMANITIES AND SOCIAL SCIENCES (HS)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	HS7151	Foundational English	HS	4	4	0	0	4
2.	HS7251	Technical English	HS	4	4	0	0	4
3.	HS7551	Employability Skills	HS	3	3	0	0	3

BASIC SCIENCES (BS)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	MA7151	Mathematics -I	BS	4	4	0	0	4
2.	PH7151	Engineering Physics	BS	3	3	0	0	3
3.	CY7151	Engineering Chemistry	BS	3	3	0	0	3
4.	BS7161	Basic Sciences Laboratory	BS	4	0	0	4	2
5.	MA7251	Mathematics II	BS	4	4	0	0	4
6.	PH7257	Physics of Materials	BS	3	3	0	0	3
7.	CY7255	Chemistry for Technologists	BS	3	3	0	0	3
8.	CY7261	Applied Chemistry Laboratory	BS	4	0	0	4	2

9.	MA7357	Probability and Statistics	BS	4	4	0	0	4

ENGINEERING SCIENCES (ES)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	GE7152	Engineering Graphics	ES	5	3	2	0	4
2.	GE7162	Engineering Practices Laboratory	ES	4	0	0	4	2
3.	GE7153	Engineering Mechanics	ES	4	4	0	0	4
4.	GE7151	Computing Techniques	ES	3	3	0	0	3
5.	GE7161	Computer Practices Laboratory	ES	4	0	0	4	2
6.	EE7254	Principles of Electrical and Electronics Engineering	ES	3	3	0	0	3
7.	EE7261	Electrical and Electronics Engineering Laboratory	ES	4	0	0	4	2
8.	CH7351	Solid Mechanics for Technologists	ES	3	3	0	0	3
9.	GE7251	Environmental Science and Engineering	ES	3	3	0	0	3

PROFESSIONAL CORE (PC)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	AT7301	Fundamentals of Garment Technology	PC	2	2	0	0	2
2.	AT7302	Technology of Fabric Formation	PC	3	3	0	0	3
3.	AT7303	Technology of Spinning Processes	PC	4	4	0	0	4
4.	AT7312	Textile Manufacturing Laboratory	PC	2	0	0	2	1
5.	AT7401	Garment Construction	PC	3	3	0	0	3
6.	AT7402	Knit Fabric Production	PC	2	2	0	0	2
7.	AT7403	Textile chemical processing I	PC	3	3	0	0	3
8.	AT7411	Pattern Making Laboratory	PC	4	0	0	4	2
9.	AT7451	Introduction to Pattern Engineering	PC	3	3	0	0	3
10.	AT7501	Textile Chemical Processing II	PC	3	3	0	0	3
11.	AT7511	Garment Construction Laboratory	PC	4	0	0	4	2
12.	AT7551	Advanced Pattern Engineering	PC	3	3	0	0	3
13.	AT7552	Garment Production Machinery	PC	3	3	0	0	3

14.	AT7561	Textile Chemical Processing Laboratory	PC	4	0	0	4	2
15.	AT7611	Fashion Design Laboratory	PC	2	0	0	2	1
16.	AT7651	Industrial Engineering in Apparel Industry	PC	3	3	0	0	3
17.	AT7701	Apparel Costing	PC	3	3	0		3
18.	AT7702	Apparel Production Planning and Process Control	PC	3	3	0	0	3
19.	AT7703	Retail Management and Visual Merchandizing	PC	3	3	0	0	3
20.	AT7711	Computer Aided Design Garment Laboratory	PC	4	0	0	4	2
21.	AT7751	Apparel Marketing and Merchandising	PC	3	3	0	0	3
22.	TT7351	Characteristics of Textile Fibers	PC	4	4	0	0	4
23.	TT7451	Woven Fabric Structure	PC	3	3	0	0	3
24.	TT7461	Fabric Analysis Laboratory	PC	4	0	0	4	2
25.	TT7651	Fabric Quality Evaluation	PC	3	3	0	0	3
26.	TT7652	Financial Management for Textile and Apparel Industries	PC	3	3	0	0	3
27.	TT7661	Fabric Quality Evaluation Laboratory	PC	4	0	0	4	2

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	AT7712	Industrial Training	EEC	0	0	0	0	3
2.	AT7713	Technical Seminar	EEC	4	0	0	4	2
3.	AT7311	Basic sewing laboratory	EEC	2	0	0	2	1
4.	AT7811	Project work	EEC	20	0	0	20	10

SUMMARY

S.No.	Subject Area	Credits as per Semester								Total Credits
		I	II	III	IV	V	VI	VII	VIII	
1.	HS	4	4				3			11
2.	BS	12	12	4						28
3.	ES	6	9	5	3	3				26
4.	PC			14	18	13	11	13		69
5.	PE					6	3	3	6	18
6.	OE						3	3		6
7.	EEC			1				5	10	16
8.	Non Credit / Mandatory	-	-	-	-	-	-	-	-	
Total		**22**	**25**	**24**	**21**	**22**	**20**	**24**	**16**	**174**

HS7151 **FOUNDATIONAL ENGLISH** **L T P C**
4 0 0 4

COURSE DESCRIPTION:
This course aims at developing the language skills necessary for the first year students of Engineering and Technology.

OBJECTIVES:
- To develop the four language skills – Listening, Speaking, Reading and Writing.
- To improve the students' communicative competence in English.
- To teach students the various aspects of English language usage.

CONTENTS

UNIT I GREETING AND INTRODUCING ONESELF 12

Listening- Types of listening – Listening to short talks, conversations; **Speaking** – Speaking about one's place, important festivals etc. – Introducing oneself, one's family/ friend;**Reading** – Skimming a passage– Scanning for specific information;**Writing**- Guided writing - Free writing on any given topic (My favourite place/ Hobbies/ School life, writing about one's leisure time activities, hometown, etc.); **Grammar** – Tenses (present and present continuous) -Question types - Regular and irregular verbs; **Vocabulary** – Synonyms and Antonyms.

UNIT II GIVING INSTRUCTIONS AND DIRECTIONS 12

Listening – Listening and responding to instructions; **Speaking** – Telephone etiquette - Giving oral instructions/ Describing a process – Asking and answering questions; **Reading** – Reading and finding key information in a given text - Critical reading - **Writing –**Process description(non-technical)- **Grammar** – Tense (simple past& past continuous) - Use of imperatives – Subject – verb agreement – Active and passive voice; - **Vocabulary** – Compound words – Word formation – Word expansion (root words).

UNIT III READING AND UNDERSTANDING VISUAL MATERIAL 12

Listening- Listening to lectures/ talks and completing a task; **Speaking** –Role play/ Simulation – Group interaction; **Reading** – Reading and interpreting visual material;**Writing**- Jumbled sentences – Discourse markers and Cohesive devices – Essay writing (cause & effect/ narrative);**Grammar** – Tenses (perfect), Conditional clauses –Modal verbs; **Vocabulary** –Cause and effect words; Phrasal verbs in context.

UNIT IV CRITICAL READING AND WRITING 12

Listening- Watching videos/ documentaries and responding to questions based on them; **Speaking**Informal and formal conversation;**Reading** –Critical reading (prediction & inference);**Writing**–Essay writing (compare & contrast/ analytical) – Interpretation of visual materials;**Grammar** – Tenses (future time reference);**Vocabulary** – One word substitutes (with meanings) – Use of abbreviations & acronyms – Idioms in sentences.

UNIT V LETTER WRITING AND SENDING E-MAILS 12

Listening- Listening to programmes/broadcast/ telecast/ podcast;**Speaking** – Giving impromptu talks, Making presentations on given topics- Discussion on the presentation;**Reading** –Extensive reading;**Writing**- Poster making – Letter writing (Formal and E-mail) ;**Grammar** – Direct and Indirect speech – Combining sentences using connectives;**Vocabulary** –Collocation;

TEACHING METHODS:
Interactive sessions for the speaking module.
Use of audio – visual aids for the various listening activities.
Contextual Grammar Teaching.

EVALUATION PATTERN:
Internals – 50%
End Semester – 50%

TOTAL : 60 PERIODS

LEARNING OUTCOMES:

- Students will improve their reading and writing skills
- Students will become fluent and proficient in communicative English
- Students will be able to improve their interpersonal communication

TEXTBOOK:

1. Richards, Jack.C with Jonathan Hull and Susan Proctor **New Interchange : English for International Communication. (level2, Student's Book)** Cambridge University Press,New Delhi: 2010.

REFERENCES:

1. Bailey, Stephen. **Academic Writing: A practical guide for students**. New York: Rutledge,2011.
2. Morgan, David and Nicholas Regan. **Take-Off: Technical English for Engineering**. London: Garnet Publishing Limited, 2008.
3. Redston, Chris & Gillies Cunningham **Face2Face** (Pre-intermediate Student's Book& Workbook) Cambridge University Press, New Delhi: 2005
4. Comfort, Jeremy, et al. **Speaking Effectively : Developing Speaking Skillsfor Business English.** Cambridge University Press, Cambridge: Reprint 2011.

MA7151	MATHEMATICS – I	L	T	P	C
		4	0	0	4

(Common to all branches of B.E. /B.Tech. Programmes in I Semester)

OBJECTIVES

- The goal of this course is for students to gain proficiency in calculus computations. In calculus, we use three main tools for analyzing and describing the behavior of functions: limits, derivatives, and integrals. Students will use these tools to solve application problems in a variety of settings ranging from physics and biology to business and economics.
- To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.

UNIT I DIFFERENTIAL CALCULUS 12

Representation of functions - New functions from old functions - Limit of a function - Limits at infinity - Continuity - Derivatives - Differentiation rules - Polar coordinate system - Differentiation in polar coordinates - Maxima and Minima of functions of one variable.

UNIT II FUNCTIONS OF SEVERAL VARIABLES 12

Partial derivatives – Homogeneous functions and Euler's theorem – Total derivative – Differentiation of implicit functions – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Errors and approximations – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.

UNIT III INTEGRAL CALCULUS 12

Definite and Indefinite integrals - Substitution rule - Techniques of Integration - Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals.

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UNIT IV MULTIPLE INTEGRALS 12

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals.

UNIT V DIFFERENTIAL EQUATIONS 12

Method of variation of parameters – Method of undetermined coefficients – Homogenous equation of Euler's and Legendre's type – System of simultaneous linear differential equations with constant coefficients.

TOTAL : 60 PERIODS

OUTCOMES

- Understanding of the ideas of limits and continuity and an ability to calculate with them and apply them.
- Improved facility in algebraic manipulation.
- Fluency in differentiation.
- Fluency in integration using standard methods, including the ability to find an appropriate method for a given integral.
- Understanding the ideas of differential equations and facility in solving simple standard examples.

TEXT BOOKS

James Stewart, "Calculus with Early Transcendental Functions", Cengage Learning, New Delhi, 2008.

2. Narayanan S. and Manicavachagom Pillai T. K., "Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2007.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley and Sons, 9th Edition, New Delhi, 2014.
4. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.

REFERENCES

1. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill Co. Ltd., New Delhi, 11th Reprint, 2010.
2. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 3rd Edition, 2007.
3. Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
4. Greenberg M.D., "Advanced Engineering Mathematics", Pearson Education, New Delhi, 2nd Edition, 5th Reprint, 2009.
5. Peter V.O'Neil, "Advanced Engineering Mathematics", Cengage Learning India Pvt., Ltd, New Delhi, 2007.

PH7151 ENGINEERING PHYSICS L T P C

(Common to all branches of B.E / B.Tech programmes) **3 0 0 3**

OBJECTIVE:

- To introduce the concept and different ways to determine moduli of elasticity and applications.
- To instill the concept of sound, reverberation, noise cancellation, and ultrasonic generation, detection and applications
- To inculcate an idea of thermal properties of materials, heat flow through materials and quantum physics
- To promote the basic understanding of interferometers, principles and applications of lasers, optical fibers and sensors
- To establish a sound grasp of knowledge on the basics, significance and growth of single crystals

UNIT I PROPERTIES OF MATTER 9

Elasticity – Poisson's ratio and relationship between moduli (qualitative) - stress-strain diagram for ductile and brittle materials, uses - factors affecting elastic modulus and tensile strength - bending of beams - cantilever - bending moment - Young's modulus determination - theory and experiment - uniform and non-uniform bending - I shaped girders - twisting couple - hollow cylinder - shaft - torsion pendulum - determination of rigidity modulus- moment of inertia of a body (regular and irregular).

UNIT II ACOUSTICS AND ULTRASONICS 9

Classification of sound - loudness and intensity - Weber-Fechner Law - standard intensity and intensity level - decibel - reverberation - reverberation time - calculation of reverberation time for different types of buildings – sound absorbing materials - factors affecting acoustics of buildings : focussing, interference, echo, echelon effect, resonance - noise and their remedies. Ultrasonics: production - magnetostriction and piezoelectric methods - detection of ultrasound - acoustic grating – ultrasonic interferometer - industrial applications – Non-destructive testing - ultrasonic method: scan modes and practice.

UNIT III THERMAL AND MODERN PHYSICS 9

Thermal expansion - thermal stress - expansion joints - bimetallic strips - thermal conductivity- heat conductions in solids – flow of heat through compound media - Forbe's and Lee's disc method: theory and experiment- Black body radiation – Planck's theory (derivation) – Compton effect – wave model of radiation and matter – Schrödinger's wave equation – time dependent and independent equations – Physical significance of wave function – particle in a one dimensional box.

UNIT IV APPLIED OPTICS 9

Interference - Michelson interferometer: construction, working, determination of wave length and thickness - anti-reflection coating - air wedge and its applications - Lasers – principle and applications – Einstein's coefficients – CO_2 and Nd:YAG laser - semiconductor lasers: homo junction and hetro junction - construction and working – applications. Optical fibres - classification (index & mode based) - principle and propagation of light in optical fibres - acceptance angle and numerical aperture - fibre optic communication system - active and passive sensors.

UNIT V CRYSTAL PHYSICS 9

Single crystalline, polycrystalline and amorphous materials – Single crystals: unit cell, crystal systems, Bravais lattices, ditections and planes in a crystal, Miller indices - interplanar distance for a cubic crystal - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures - structure and significance of NaCl, CsCl, ZnS and graphite - crystal imperfections: point defects, line defects – Burger vectors, dislocations and stacking faults – Growth of single crystals: Bridgman and Czochralski methods.

TOTAL: 45 PERIODS

OUTCOME:

- The students will understand different moduli of elasticity, their determination and applications.
- The students will gain knowledge on the properties of sound, noise cancellation, and production, detection and applications of ultrasonics
- The students will acquire sound knowledge on thermal expansion and thermal conductivity of materials. Further they will gain an idea of quantum physics.
- The students will gain knowledge on interferometers, lasers and fiber optics
- The students will secure knowledge on the basics of crystal structures and their significance. Further they gain basic ideas of growing single crystals.

TEXTBOOKS:

1. Gaur R.K. and Gupta S.L., "Engineering Physics", Dhanpat Rai Publications (2013)
2. Palanisamy P.K., "Engineering Physics", Scitech Publications (P) Ltd. (2006).
2. Arumugam M., "Engineering Physics", Anuradha Publications (2000)

REFERENCES:

1. Serway R.A. and Jewett, J.W. "Physics for Scientists and Engineers with Modern Physics". Brooks/cole Publishing Co. (2010).

2. Tipler P.A. and Mosca, G.P., “Physics for Scientists and Engineers with Modern Physics”. W.H.Freeman, (2007).
3. Markert J.T.,Ohanian, H. and Ohanian, M. “Physics for Engineers and Scientists”. W.W.Norton & Co. (2007).

CY7151 ENGINEERING CHEMISTRY

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

- To develop an understanding about fundamentals of polymer chemistry.
- Brief elucidation on surface chemistry and catalysis.
- To develop sound knowledge photochemistry and spectroscopy.
- To impart basic knowledge on chemical thermodynamics.
- To understand the basic concepts of nano chemistry.

UNIT I POLYMER CHEMISTRY 9

Introduction: Functionality-degree of polymerization. Classification of polymers- natural and synthetic, thermoplastic and thermosetting. Types and mechanism of polymerization: addition (free radical, cationic, anionic and living); condensation and copolymerization. Properties of polymers: Tg, tacticity, molecular weight-weight average, number average and polydispersity index. Techniques of polymerization: Bulk, emulsion, solution and suspension.

UNIT II SURFACE CHEMISTRYAND CATALYSIS 9

Adsorption-Types of adsorption-adsorption of gases on solids- adsorption from solutions- Types of isotherms–Frendlich adsorption isotherm,Langmuir adsorption isotherm.Industrial applications of adsorption. Catalysis: Characteristics and types of catalysts-homogeneous and heterogeneous, auto catalysis. Enzyme catalysis -factors affecting enzyme catalysis, Michaelis-Menton equation.Industrial applications of catalysts.

UNIT III PHOTOCHEMISTRY AND SPECTROSCOPY 9

Photochemistry: Laws of photochemistry-Grotthuss-Draper law, Stark-Einstein law and Lambert-Beer Law. Photo processes-internal conversion, inter-system crossing, fluorescence, phosphorescence, chemiluminescence and photo-sensitization. Spectroscopy: Electromagnetic spectrum-absorption of radiation-electronic, vibrational and rotational transitions. Width and intensities of spectral lines.Spectrophotometric estimation of iron.UV-Vis and IR spectroscopy-principles, instrumentation (Block diagram) and applications.

UNIT IV CHEMICAL THERMODYNAMICS 9

Second law: Entropy-entropy change for an ideal gas, reversible and irreversible processes; entropy of phase transitions; Free energy and work function: Helmholtzand Gibbs free energy functions; Criteria of spontaneity; Gibbs-Helmholtz equation; Clausius Clapeyron equation; Maxwell relations-Van’t Hoff isotherm and isochore. Chemical potential; Gibbs-Duhem equation-variation of chemical potential with temperature and pressure.

UNIT V NANOCHEMISTRY 9

Basics-distinction between molecules, nanoparticles and bulk materials; size-dependent properties.Preparation of nanoparticles – sol-gel and solvothermal.Preparation of carbon nanotube by chemical vapour deposition and laser ablation.Preparation of nanowires by VLS growth, electrochemical deposition and electro spinning.Properties and uses of nanoparticles, nanoclusters, nanorods, nanotubes and nanowires.

TOTAL : 45 PERIODS

COURSE OUTCOMES

- Will be familiar with polymer chemistry, surface chemistry and catalysis.
- Will know the photochemistry, spectroscopy and chemical thermodynamics.

- Will know the fundamentals of nano chemistry.

TEXT BOOKS

1. Jain P. C. & Monica Jain., "Engineering Chemistry", DhanpatRai Publishing Company (P) Ltd, New Delhi, 2014.
2. Kannan P., Ravikrishnan A., "Engineering Chemistry", Sri Krishna Hitech Publishing Company Pvt. Ltd. Chennai, 2014

REFERENCES

1. Pahari A., Chauhan B., "Engineering Chemistry", Firewall Media, New Delhi, 2012.
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2012.
3. AshimaSrivastava. Janhavi N N, Concepts of Engineering Chemistry", ACME Learning Private Limited., New Delhi., 2010.
4. Vairam S., Kalyani P., Suba Ramesh., "Engineering Chemistry", Wiley India Pvt Ltd., New Delhi., 2011.

GE7152 ENGINEERING GRAPHICS

L	T	P	C
3	2	0	4

OBJECTIVES

• To develop in students, graphic skills for communication of concepts, ideas and design of engineering products and expose them to existing national standards related to technical drawings.

CONCEPTS AND CONVENTIONS (NOT FOR EXAMINATION) **1**

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT I PLANE CURVES ANDFREE HANDSKETCHING **14**

Basic Geometrical constructions, Curves used in engineering practices-Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves. Visualization concepts and Free Hand sketching: Visualization principles – Representation of Three Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of objects

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES **14**

Orthographic projection- principles-Principal planes-First angle projection-Projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes-Determination of true lengths and true inclinations by rotating line method and trapezoidal method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III PROJECTION OF SOLIDS **14**

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to both the principal planes by rotating object method and auxiliary plane method.

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES **14**

Sectioning of solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section.

Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones. Development of lateral surfaces of solids with cut-outs and holes.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS **15**

Principles of isometric projection – isometric scale –Isometric projections of simple solids and

truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions and miscellaneous problems.
Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method and vanishing point method.

COMPUTER AIDED DRAFTING (DEMONSTRATION ONLY) **3**
Introduction to drafting packages and demonstration of their use.

L=45+T=30, TOTAL: 75 PERIODS

OUTCOMES:
On Completion of the course the student will be able to
- Perform free hand sketching of basic geometrical shapes and multiple views of objects.
- Draw orthographic projections of lines, Planes and Solids
- Obtain development of surfaces.
- Prepare isometric and perspective views of simple solids.

TEXT BOOK:
1. N.D.Bhatt and V.M.Panchal, "Engineering Drawing", Charotar Publishing House, 50th Edition, 2010.

REFERENCES:
1. K.R.Gopalakrishna., "Engineering Drawing" (Vol I&II combined) SubhasStores, Bangalore, 2007
2. Luzzader, Warren.J., and Duff,John M.,,'' Fundamentals of Engineering Drawingwith an introduction to Interactive Computer Graphics for Design and Production",Eastern Economy Edition, Prentice Hall of India Pvt Ltd, New Delhi, 2005
3. M.B.Shah and B.C.Rana, "Engineering Drawing", Pearson, 2nd Edition, 2009
4. K.Venugopal and V.Prabhu Raja, "Engineering Graphics", New Age International (P)Limited ,2008.
5. K. V.Natarajan, "A text book of Engineering Graphics", 28th Edition, Dhanalakshmi Publishers, Chennai, 2015.
6. BasantAgarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
7. N.S Parthasarathy and Vela Murali, " Engineering Drawing", Oxford University Press, 2015

Publication of Bureau of Indian Standards:
1. IS 10711 – 2001: Technical products Documentation – Size and lay out ofdrawing sheets
2. IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

Special points applicable to University Examinations on Engineering Graphics:
1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day.

Attested

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BS7161 **BASIC SCIENCES LABORATORY** **L T P C**

(Common to all branches of B.E. / B.Tech Programmes) **0 0 4 2**

PHYSICS LABORATORY: (Any Seven Experiments)

OBJECTIVE:

- To inculcate experimental skills to test basic understanding of physics of materials including properties of matter, thermal and optical properties.
- To induce the students to familiarize with experimental determination of velocity of ultrasonic waves, band gap determination and viscosity of liquids.

1. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of disc
2. Non-uniform bending - Determination of young's modulus
3. Uniform bending – Determination of young's modulus
4. Lee's disc Determination of thermal conductivity of a bad conductor
5. Potentiometer-Determination of thermo e.m.f of a thermocouple
6. Laser- Determination of the wave length of the laser using grating
7. Air wedge - Determination of thickness of a thin sheet/wire
8. a) Optical fibre -Determination of Numerical Aperture and acceptance angle
   b) Compact disc- Determination of width of the groove using laser.
9. Acoustic grating- Determination of velocity of ultrasonic waves in liquids.
10. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids
11. Post office box -Determination of Band gap of a semiconductor.
12. Spectrometer- Determination of wavelength using gating.
13. Viscosity of liquids - Determination of co-efficient of viscosity of a liquid by Poiseuille's flow

TOTAL: 30 PERIODS

OUTCOME:

Upon completion of the course, the students will be able

- To determine various moduli of elasticity and also various thermal and optical properties of materials.
- To determine the velocity of ultrasonic waves, band gap determination and viscosity of liquids.

CHEMISTRY LABORATORY:

(Minimum of 8 experiments to be conducted)

1. Estimation of HCl using Na_2CO_3 as primary standard and Determination of alkalinity in water sample.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of DO content of water sample by Winkler's method.
4. Determination of chloride content of water sample by argentometric method.
5. Estimation of copper content of the given solution by Iodometry.
6. Determination of strength of given hydrochloric acid using pH meter.
7. Determination of strength of acids in a mixture of acids using conductivity meter.
8. Estimation of iron content of the given solution using potentiometer.
9. Estimation of iron content of the water sample using spectrophotometer (1, 10-Phenanthroline/thiocyanate method).
10. Estimation of sodium and potassium present in water using flame photometer.
11. Determination of molecular weight of poly vinyl alcohol using Ostwald viscometer.
12. Pseudo first order kinetics-ester hydrolysis.
13. Corrosion experiment-weight loss method.
14. Determination of CMC.
15. Phase change in a solid.

TOTAL: 30 PERIODS

TEXTBOOKS

1. Vogel's Textbook of Quantitative Chemical Analysis (8^{TH} edition, 2014)

2. Laboratory Manual- Department of Chemistry, CEGC, Anna University (2014).

GE7162	ENGINEERING PRACTICES LABORATORY (Common to all Branches of B.E. / B.Tech. Programmes)	L 0	T 0	P 4	C 2

COURSE OBJECTIVES

• To provide exposure to the students with hands-on experience on various Basic Engineering Practices in Civil, Mechanical, Electrical and Electronics Engineering.

GROUP – A (CIVIL & ELECTRICAL)

1. CIVIL ENGINEERING PRACTICES 15

PLUMBING

- Basic pipe connections involving the fittings like valves, taps, coupling, unions, reducers, elbows and other components used in household fittings. Preparation of plumbing line sketches.
- Laying pipe connection to the suction side of a pump.
- Laying pipe connection to the delivery side of a pump.
- Practice in connecting pipes of different materials: Metal, plastic and flexible pipes used in householdappliances.

WOOD WORK

- Sawing, planing and making joints like T-Joint, Mortise and Tenon joint and Dovetail joint.

STUDY

- Study of joints in door panels and wooden furniture
- Study of common industrial trusses using models.

2. **ELECTRICAL ENGINEERING PRACTICES** 15

- Basic household wiring using Switches, Fuse, Indicator and Lamp etc.,
- Stair case light wiring
- Tube – light wiring
- Preparation of wiring diagrams for a given situation.
- Study of Iron-Box, Fan Regulator andEmergency Lamp

GROUP – B (MECHANICAL AND ELECTRONICS)

3. **MECHANICAL ENGINEERING PRACTICES** 15

WELDING

- Arc welding of Butt Joints, Lap Joints, and Tee Joints
- Gas welding Practice.
- Basic Machining - Simple turning, drilling and tapping operations..
- Study and assembling of the following:
  a. Centrifugal pump
  b. Mixie
  c. Air Conditioner.

DEMONSTRATION ON FOUNDRY OPERATIONS.

4. **ELECTRONIC ENGINEERING PRACTICES** 15

- Soldering simple electronic circuits and checking continuity.
- Assembling electronic components on a small PCB and Testing.
- Study of Telephone, FM radio andLow Voltage Power supplies.

TOTAL : 60 PERIODS

Attested

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COURSE OUTCOMES

- Ability to fabricate carpentry components and to lay pipe connections including plumbing works.
- Ability to use welding equipments to join the structures
- Ability to do wiring for electrical connections and to fabricate electronics circuits.

HS7251 TECHNICAL ENGLISH L T P C
4 0 0 4

OBJECTIVES

- To enable students acquire proficiency in technical communication.
- To enhance their reading and writing skills in a technical context.
- To teach various language learning strategies needed in a professional environment.

CONTENTS

UNIT I ANALYTICAL READING 12

Listening- Listening to informal and formal conversations; **Speaking** – Conversation Skills(opening, turn taking, closing)-explaining how something works-describing technical functions and applications;**Reading** –Analytical reading, Deductive and inductive reasoning; **Writing**- vision statement–structuring paragraphs.

UNIT II SUMMARISING 12

Listening- Listening to lectures/ talks on Science & Technology;**Speaking** –Summarizing/ Oral Reporting, **Reading** – Reading Scientific and Technical articles; **Writing**- Extended definition –Lab Reports – Summary writing.

UNIT III DESCRIBING VISUAL MATERIAL 12

Listening- Listening to a panel discussion; **Speaking** – Speaking at formal situations; **Reading** – Reading journal articles - Speed reading;**Writing**-data commentary-describing visual material-writing problem-process- solution-the structure of problem-solution texts- writing critiques

UNIT IV WRITING/ E-MAILING THE JOB APPLICATION 12

Listening- Listening to/ Viewing model interviews; **Speaking** –Speaking at different types of interviews – Role play practice (mock interview); **Reading** – Reading job advertisements and profile of the company concerned;**Writing**- job application – cover letter –Résumé preparation.

UNIT V REPORT WRITING 12

Listening- Viewing a model group discussion;**Speaking** –Participating in a discussion - Presentation;**Reading** – Case study - analyse -evaluate – arrive at a solution;**Writing**– Recommendations- Types of reports (feasibility report)- designing and reporting surveys- – Report format.- writing discursive essays.

TEACHING METHODS:

Practice writing
Conduct model and mock interview and group discussion.
Use of audio – visual aids to facilitate understanding of various forms of technical communication.
Interactive sessions.

EVALUATION PATTERN:

Internals – 50%
End Semester – 50%

TOTAL:60 PERIODS

LEARNING OUTCOMES

- Students will learn the structure and organization of various forms of technical communication.
- Students will be able to listen and respond to technical content.
- Students will be able to use different forms of communication in their respective fields.

TEXTBOOK:

1. Craig,Thaine**. Cambridge Academic English: An integrated skills course for EAP(Student's Book)Level: Intermediate** Cambridge University Press, New Delhi: 2012

REFERENCES:

1. Laws, Anne. **Presentations.** Hyderabad: Orient Blackswan, 2011.
2. Ibbotson, Mark. **Cambridge English for Engieering**. Cambridge University Press, Cambridge,New Delhi: 2008
3. Naterop, Jean B. and Rod Revell. **Telephoning in English**. Cambridge: Cambridge University Press, 2004.
4. Rutherford, Andrea J. **Basic Communication Skills for Technology**. New Delhi: Pearson Education, 2001.
5. Bailey, Stephen. **Academic Writing A practical Guide for Students**. Routledge, London: 2004.
6. Hewings, Martin**. Cambridge Academic English: An integrated skills course for EAP(Student's Book)Level: Intermediate** Cambridge University Press, New Delhi: 2012.

MA7251 MATHEMATICS – II

L	T	P	C
4	0	0	4

OBJECTIVES

- To develop the use of matrix algebra techniques this is needed by engineers for practical applications.
- To acquaint the student with the concepts of vector calculus, needed for problems in all engineering disciplines.
- To develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence, in application areas such as heat conduction, elasticity, fluid dynamics and flow the of electric current.
- To make the student appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated.

UNIT I MATRICES 12

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of eigenvalues and eigenvectors – Cayley-Hamilton theorem – Diagonalization of matrices – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms.

UNIT II VECTOR CALCULUS 12

Gradient and directional derivative – Divergence and Curl – Irrotational and Solenoidal vector fields – Line integral over a plane curve – Surface integral - Area of a curved surface - Volume integral - Green's, Gauss divergence and Stoke's theorems – Verification and application in evaluating line, surface and volume integrals.

UNIT III ANALYTIC FUNCTION 12

Analytic functions – Necessary and sufficient conditions for analyticity - Properties – Harmonic conjugates – Construction of analytic function - Conformal mapping – Mapping by functions $w = z + c,\ az,\ \frac{1}{z},\ z^2$ - Bilinear transformation.

UNIT IV COMPLEX INTEGRATION 12

Line integral - Cauchy's integral theorem – Cauchy's integral formula – Taylor's and Laurent's series – Singularities – Residues – Residue theorem – Application of residue theorem for evaluation of real integrals – Use of circular contour and semicircular contour with no pole on real

axis.

UNIT V LAPLACE TRANSFORMS 12

Existence conditions – Transforms of elementary functions – Transform of unit step function and unit impulse function – Basic properties – Shifting theorems -Transforms of derivatives and integrals – Initial and final value theorems – Inverse transforms – Convolution theorem — Transform of periodic functions – Application to solution of linear ordinary differential equations with constant coefficients.

TOTAL : 60 PERIODS

OUTCOMES

Upon successful completion of the course, students should be able to:

- Evaluate real and complex integrals using the Cauchy integral formula and the residue theorem
- Appreciate how complex methods can be used to prove some important theoretical results.
- Evaluate line, surface and volume integrals in simple coordinate systems
- Calculate grad, div and curl in Cartesian and other simple coordinate systems, and establish identities connecting these quantities
- Use Gauss, Stokes and Greens theorems to simplify calculations of integrals and prove simple results.

TEXT BOOKS

1. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley and Sons, 9th Edition, New Delhi, 2014.
2. Grewal B.S., “Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 43rd Edition, 2014.

REFERENCES

1. Ramana, B.V. “Higher Engineering Mathematics”, Tata McGraw Hill, New Delhi, 2010.
2. Glyn James, “Advanced Modern Engineering Mathematics”, Pearson Education, New Delhi, 2007.
3. Jain R.K. and Iyengar S.R.K., “Advanced Engineering Mathematics”, Narosa Publications, New Delhi, 3rd Edition, 2007.
4. Bali N., Goyal M. and Watkins C., “Advanced Engineering Mathematics”, Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
5. Peter V. O’Neil , “Advanced Engineering Mathematics”, Cengage Learning India Pvt., Ltd, New Delhi, 2007.

PH7257 PHYSICS OF MATERIALS L T P C

(Common to Chemical, Ceramic, Food, Leather, Textile, Apparel, Industrial Biotechnology, Pharmaceutical and PET) **3 0 0 3**

OBJECTIVE:

- To make the students to understand the basics of phase diagrams and various materials preparation techniques
- To equip the students to have a knowledge on different types of electron theory, basics of quantum mechanics and about superconductors
- To introduce the physics of semiconducting materials and applications of semiconductors in device fabrication
- To familiarize the students with the theory and applications of magnetic and dielectric materials
- To provide the students a sound platform towards learning about advanced materials and their applications.

UNIT I PREPARATION OF MATERIALS 9

Phases - phase rule – binary systems – tie line rule – lever rule – phase diagram – invariant reactions - nucleation – homogeneous and heterogeneous nucleation – free energy of formation of a critical nucleus – Thin films – preparation: PVD, CVD method – Nanomaterials Preparation: wet chemical, solvothermal, sol-gel method.

UNIT II ELECTRICAL AND SUPERCONDUCTING MATERIALS 9

Classical free electron theory - expression for electrical conductivity – thermal conductivity, - Wiedemann-Franz law - Quantum free electron theory – applications of Schrodinger wave equation: particle in a finite potential well – particle in a three-dimensional box- degenerate states – Fermi-Dirac statistics – density of energy states – electron in periodic potential – electron effective mass – concept of hole. Superconducting phenomena, properties of superconductors – Meissner effect and isotope effect. Type I and Type II superconductors, High T_c superconductors – Magnetic levitation and SQUIDS.

UNIT III SEMICONDUCTING MATERIALS 9

Elemental Semiconductors - Compound semiconductors - Origin of band gap in solids (qualitative) - carrier concentration in metals - carrier concentration in an intrinsic semiconductor (derivation) – Fermi level – variation of Fermi level with temperature – electrical conductivity – band gap determination – carrier concentration in n-type and p-type semiconductors (derivation) – variation of Fermi level with temperature and impurity concentration – Hall effect – determination of Hall coefficient – LED - Solar cells.

UNIT IV DIELECTRIC AND MAGNETIC MATERIALS 9

Dielectric, Paraelectric and ferroelectric materials - Electronic, Ionic, Orientational and space charge polarization – Internal field and deduction of Clausius Mosotti equation – dielectric loss – different types of dielectric breakdown – classification of insulating materials and their applications - Ferroelectric materials - Introduction to magnetic materials - Domain theory of ferromagnetism, Hysteresis, Soft and Hard magnetic materials – Anti-ferromagnetic materials – Ferrites, Giant Magneto Resistance materials.

UNIT V NEW MATERIALS AND APPLICATIONS 9

Ceramics – types and applications – Composites: classification, role of matrix and reinforcement – processing of fibre reinforced plastics and fibre reinforced metals – Metallic glasses – Shape memory alloys – Copper, Nickel and Titanium based alloys – grapheme and its properties – Relaxor ferroelectrics - Bio materials – hydroxyapatite – PMMA – Silicone - Sensors: Chemical Sensors - Bio-sensors – Polymer semiconductors – Photoconducting polymers.

TOTAL: 45 PERIODS

OUTCOME:

On completion of the course, the students will be able to

- acquire knowledge of phase diagram, and thin film and nanomaterial preparation techniques
- familiarize with conducting materials, basic quantum mechanics, and properties and applications of superconductors.
- gain knowledge on semiconducting materials based on energy level diagrams, its types, temperature effect. Also, fabrication methods for semiconductor devices will be understood.
- realize with theories and applications of dielectric and ferromagnetic materials
- familiarize with ceramics, composites, metallic glasses, shape memory alloys, biomaterials and their important applications.

.

REFERENCES:

1. Callister W. D. and Rethwisch, D. G., “Materials Science and Engineering”, 9th Edition, Wiley (2014).
2. Raghavan V., “Materials Science and Engineering”, Prentice Hall of India (2004).
3. Askeland D.R. and Wright, W.J., “Essentials of Materials Science and Engineering”, 3rd Edition, Cengage Learning (2014).
4. Pillai, S.O., “Solid State Physics”, New Age International, 7th Edition (2015).

5. Viswanathan, B., “Nanomaterials”, Narosa Book Distributors Pvt Ltd. (2011).

CY7255	CHEMISTRY FOR TECHNOLOGISTS	L	T	P	C
		3	0	0	3

OBJECTIVE

- The students should be conversant with
- boiler feed water requirements, water treatment techniques,
- Applications of oil and its properties, principles of different chemical analysis.
- Different kinds of preparations of important chemicals.

OUTCOME

- Will be familiar with boiler feed water requirements, water treatment techniques.
- Will know the oil and its properties, principles of different chemical analysis.
- Will know the preparations of important chemicals.

UNIT I WATER TECHNOLOGY 9

Water quality parameters- hardness -definition - units of hardness - determination of hardness (EDTA method).Alkalinity - definition - determination of alkalinity.TDS, BOD, COD and iron and their significance. Softening – zeolite and demineralization processes. Boiler troubles (scale, sludge, boiler corrosion, caustic embrittlement and carry over) and remedies – removal of oils and silica, internal conditioning.Desalination by electro-dialysis and reverse osmosis.

UNIT II OILS, FATS, SOAPS & LUBRICANTS 9

Chemical constitution, chemical analysis of oils and fats – free acid, saponification and iodine values, definitions, determinations and significance.Soaps and detergents - cleaning action of soap. Lubricants - definition, characteristics, types and properties – viscosity, viscosity index, carbon residue, oxidation stability, flash and fire points, cloud and pour points, aniline point. Solid lubricants – graphite and molybdenum disulphide.

UNIT III CHEMICAL ANALYSIS – AN ANALYTICAL INSIGHT 9

Gravimetric analysis – principles – method – applications.redox titrations – principle – method – applications. Thin layer chromatography – principles – techniques – applications. Principles underlying the estimations of nitrogen in nitrogeneous fertilizers, phenol and aniline.

UNIT IV DYE CHEMISTRY 9

Witt’s theory and modern theory of colors – synthesis of methyl red, methyl orange, congo red, malachite green, p-rosaniline, phenolphthalein, fluorescence, eosin dyes.

UNIT V CHEMICALS AND AUXILIARIES 9

Preparations of bleaching powder, sodium hypochlorite, hydrogen peroxide, chlorine dioxide – estimation of available chlorine in hypochlorite – determination of strength of hydrogen peroxide.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Jain & Jain, "Engineering Chemistry", 16th Edition, 2014,DhanpatRai Publishing Company, New Delhi.
2. Sharma B.K, "Industrial Chemistry", 16th Edition, 2014, GOEL Publishing House, Meerut.

REFERENCES

1. Dara SS, Umare SS, "A Textbook of Engineering Chemistry", S. Chand & Company Ltd., New Delhi, 2010.
2. Puri BR, Sharma LR, Pathania S, "Principles of Physical Chemistry", 42nd Edition, 2008, Vishal Publishing Co., Jalandhar.
3. Morrison RT, Boyd RN, Bhattacharjee SK, “Organic Chemistry”, 7th Edition, Pearson India, 2011.

GE7153 ENGINEERING MECHANICS

L	T	P	C
4	0	0	4

OBJECTIVE :

The objective of this course is to inculcate in the student the ability to analyze any problem in a simple and logical manner and to predict the physical phenomena and thus lay the foundation for engineering applications.

UNIT I STATICS OF PARTICLES 12

Fundamental Concepts and Principles, Systems of Units, Method of Problem Solutions, Statics of Particles -Forces in a Plane, Resultant of Forces, Resolution of a Force into Components, Rectangular Components of a Force, Unit Vectors.

Equilibrium of a Particle- Newton's First Law of Motion, Space and Free-Body Diagrams, Forces in Space, Equilibrium of a Particle in Space.

UNIT II EQUILIBRIUM OF RIGID BODIES 12

Principle of Transmissibility, Equivalent Forces, Vector Product of Two Vectors, Moment of a Force about a Point ,Varignon's Theorem, Rectangular Components of the Moment of a Force, Scalar Product of Two Vectors, Mixed Triple Product of Three Vectors, Moment of a Force about an Axis, Couple - Moment of a Couple, Equivalent Couples, Addition of Couples, Resolution of a Given Force into a Force -Couple system, Further Reduction of a System of Forces, Equilibrium in Two and Three Dimensions - Reactions at Supports and Connections.

UNIT III DISTRIBUTED FORCES 16

Centroids of lines and areas – symmetrical and unsymmetrical shapes, Determination of Centroids by Integration , Theorems of Pappus-Guldinus, Distributed Loads on Beams, Center of Gravity of a Three-Dimensional Body, Centroid of a Volume, Composite Bodies , Determination of Centroids of Volumes by Integration.

Moments of Inertia of Areas and Mass - Determination of the Moment of Inertia of an Area by Integration , Polar Moment of Inertia , Radius of Gyration of an Area , Parallel-Axis Theorem , Moments of Inertia of Composite Areas, Moments of Inertia of a Mass - Moments of Inertia of Thin Plates , Determination of the Moment of Inertia of a Three-Dimensional Body by Integration.

UNIT IV FRICTION 8

The Laws of Dry Friction. Coefficients of Friction, Angles of Friction, Wedges, Wheel Friction. Rolling Resistance , Ladder friction.

UNIT V DYNAMICS OF PARTICLES 12

Kinematics - Rectilinear Motion and Curvilinear Motion of Particles.

Kinetics- Newton's Second Law of Motion -Equations of Motions , Dynamic Equilibrium, Energy and Momentum Methods - Work of a Force , Kinetic Energy of a Particle, Principle of Work and Energy, Principle of Impulse and Momentum, Impact, Method of Virtual Work - Work of a Force, Potential Energy, Potential Energy and Equilibrium.

L – 45 + T – 15 TOTAL: 60 PERIODS

OUTCOMES:

- Upon completion of this course, students will be able to construct meaningful mathematical models of physical problems and solve them.

TEXT BOOK

1. Beer,F.P and Johnson Jr. E.R, "Vector Mechanics for Engineers", McGraw-Hill Education (India) Pvt. Ltd. 10th Edition, 2013.

REFERENCES

1. Hibbeller, R.C., Engineering Mechanics: Statics, and Engineering Mechanics: Dynamics, 13th edition, Prentice Hall, 2013.
2. J.L. Meriam & L.G. Karige, Engineering Mechanics: Statics (Volume I) and Engineering Mechanics: Dynamics, 7th edition, Wiley student edition, 2013.

3. P. Boresi & J. Schmidt, Engineering Mechanics: Statics and Dynamics, 1/e, Cengage learning, 2008.
4. Irving H. Shames, G. Krishna Mohana Rao, Engineering Mechanics - Statics and Dynamics, Fourth Edition – PHI / Pearson Education Asia Pvt. Ltd., 2006.
5. Vela Murali, "Engineering Mechanics", Oxford University Press (2010)

GE7151	COMPUTING TECHNIQUES	L	T	P	C
	(Common to all branches of Engineering and Technology)	**3**	**0**	**0**	**3**

OBJECTIVES:

- To learn programming using a structured programming language.
- To provide C programming exposure.
- To introduce foundational concepts of computer programming to students of different branches of Engineering and Technology.

UNIT I INTRODUCTION 9

Introduction to Computers – Computer Software – Computer Networks and Internet - Need for logical thinking – Problem formulation and development of simple programs - Pseudo code - Flow Chart and Algorithms.

UNIT II C PROGRAMMING BASICS 9

Introduction to C programming – Fundamentals – Structure of a C program – Compilation and linking processes - Constants, Variables – Data Types – Expressions - Operators –Decision Making and Branching – Looping statements – Solving Simple Scientific and Statistical Problems.

UNIT III ARRAYS AND STRINGS 9

Arrays – Initialization – Declaration – One dimensional and two dimensional arrays - Strings- String operations – String Arrays - simple programs- sorting- searching – matrix operations.

UNIT IV POINTERS 9

Macros - Storage classes –Basic concepts of Pointers– Pointer arithmetic - Example Problems - Basic file operations

UNIT V FUNCTIONS AND USER DEFINED DATA TYPES 9

Function – definition of function – Declaration of function – Pass by value – Pass by reference – Recursion –Enumerators – Structures - Unions

TOTAL : 45 PERIODS

OUTCOMES

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

- Write C program for simple applications
- Formulate algorithm for simple problems
- Analyze different data types and arrays
- Perform simple search and sort**.**
- Use programming language to solve problems.

TEXTBOOKS:

1. Pradip Dey, Manas Ghosh, "Computer Fundamentals and Programming in C", Second Edition, Oxford University Press, 2013
2. Ashok N. Kamthane, "Computer programming", Pearson Education, 2007.
3. Yashavant P. Kanetkar. "Let Us C", BPB Publications, 2011.

REFERENCES:

1. Kernighan,B.W and Ritchie,D.M, "The C Programming language", Second Edition, Pearson Education, 2006
2. Byron S Gottfried, "Programming with C", Schaums Outlines, Second Edition, Tata McGraw-Hill, 2006.
3. R.G. Dromey, "How to Solve it by Computer", Pearson Education, Fourth Reprint, 2007

CY7261	APPLIED CHEMISTRY LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVE

- To make the student acquire practical skills in the wet chemical and instrumental methods for quantitative estimation of nitrite in water, cement, oil, coal, Phenol

LIST OF EXPERIMENTS

1. Determination of Redwood / Saybolt numbers, kinematic viscosity and viscosity index of lubricating oils
2. Determination of flash point, fire point, cloud and pour point of oils
3. Determination of acid value, iodine value of oils and saponification value.
4. Determination of COD of water samples
5. Determination of total, temporary & permanent hardness of water by EDTA method.
6. Estimation of HCI using Na_2CO_3 as primary standard and determination of alkalinity in water sample.
7. Determination of purity of washing soda and strength of a commercial acid
8. Estimation of available chlorine in hypochlorite solution
9. Estimation of strength of hydrogen peroxide
10. Estimation of Phenol.
11. Determination of Calorific value using Bomb calorimeter

TOTAL: 60 PERIODS

OUTCOME

- Familiarization with equipment like viscometers, flash and fire point apparatus etc
- Familiarization of methods for determining COD
- Familiarization of a few simple synthetic techniques for soap

TEXT BOOKS

1. Daniel R. Palleros, “Experimental organic chemistry” John Wiley & Sons, Inc., New York (2001).
2. Furniss B.S. Hannaford A.J, Smith P.W.G and Tatchel A.R., Vogel’s Textbook of practical organic chemistry, LBS Singapore (2010).

GE7161	COMPUTER PRACTICES LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES

- To understand the basic programming constructs and articulate how they are used to develop a program with a desired runtime execution flow.
- To articulate where computer programs fit in the provision of computer-based solutions to real world problems.
- To learn to use user defined data structures.

LIST OF EXPERIMENTS

1. Search, generate, manipulate data using MS office/ Open Office
2. Presentation and Visualization – graphs, charts, 2D, 3D
3. Problem formulation, Problem Solving and Flowcharts
4. C Programming using Simple statements and expressions
5. Scientific problem solving using decision making and looping.
6. Simple programming for one dimensional and two dimensional arrays.
7. Solving problems using String functions
8. Programs with user defined functions
9. Program using Recursive Function
10. Program using structures and unions.

TOTAL: 60 PERIODS

Attested

DIRECTOR
Centre For Academic Courses
Anna University, Chennai-600 025.

OUTCOMES

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

- Write and compile programs using C programs.
- Write program with the concept of Structured Programming
- Identify suitable data structure for solving a problem
- Demonstrate the use of conditional statement.

LABORATORY REQUIREMENTS FOR BATCH OF 30 STUDENTS

30 Systems with C compiler

MA7357 PROBABILITY AND STATISTICS L T P C
4 0 0 4

OBJECTIVES:

- To make the students acquire a sound knowledge in statistical techniques that model engineering problems.
- The Students will have a fundamental knowledge of the concepts of probability.

UNIT I RANDOM VARIABLES 12

Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential, Gamma, Weibull and Normal distributions - Functions of a random variable.

UNIT II TWO-DIMENSIONAL RANDOM VARIABLES 12

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and Linear regression – Transformation of random variables – Central limit theorem (for independent and identically distributed random variables).

UNIT III TESTS OF SIGNIFICANCE 12

Sampling distributions - Tests for single mean, proportion, Difference of means (large and small samples) – Tests for single variance and equality of variances – $\chi 2$- test for goodness of fit – Independence of attributes – Non-parametric tests: Test for Randomness and Rank - sum test (Wilcoxon test).

UNIT IV DESIGN OF EXPERIMENTS 12

Completely randomized design – Randomized block design – Latin square design - 2^2 - factorial design - Taguchi's robust parameter design.

UNIT V STATISTICAL QUALITY CONTROL 12

Control charts for measurements ($\overline{X}$ and R charts) – Control charts for attributes (p, c and np charts) – Tolerance limits - Acceptance sampling.

TOTAL : 60 PERIODS

OUTCOMES:

- Students will be able characterize probability models using probability mass (density) functions & cumulative distribution functions.
- The students can independently participate in the processes of analysis, planning, formulating strategies of development, decision-making, governing and management, and independent making of tactical and strategic decisions related to the statistics.

TEXT BOOKS:

1. Milton, J. S. and Arnold, J.C., "Introduction to Probability and Statistics", Tata McGraw Hill, New Delhi, 4th Edition, 3rd Reprint, 2008.
2. Johnson, R.A. and Gupta, C.B., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2011.

REFERENCES:

1. Devore, J.L., "Probability and Statistics for Engineering and the Sciences", Thomson Brooks/Cole, International Student Edition, New Delhi, 7th Edition, 2008.
2. Walpole, R.E., Myers, R.H., Myers, S.L. and Ye, K., "Probability and Statistics for Engineers and Scientists", Pearson Education, Asia, 8th Edition, 2007.
3. Ross, S.M., "Introduction to Probability and Statistics for Engineers and Scientists", Elsevier, New Delhi, 3rd Edition, 2004.
4. Spiegel, M.R., Schiller, J. and Srinivasan, R.A., "Schaum's Outline of Theory and Problems of Probability and Statistics", Tata McGraw Hill, New Delhi, 2004.

EE7254 PRINCIPLES OF ELECTRICAL AND ELECTRONICS ENGINEERING L T P C
3 0 0 3

OBJECTIVES:

To impart knowledge on

- Electric circuit laws , single and three phase circuits and wiring
- Working principles of Electrical Machines
- Various electronic devices and measuring instruments

UNIT I ELECTRICAL CIRCUITS 9

Basic principles involved in power generation, transmission and distribution, Ohms Law ,Kirchoff's Law , steady state solution of DC circuits , Thevinin's Theorem, Norton's Theorem, Superposition Theorem.

UNIT II AC CIRCUITS 9

Introduction to AC circuits – waveforms and RMS value – power and power factor, single phase and three-phase balanced circuits, housing wiring, industrial wiring, materials of wiring.

UNIT III ELECTRICAL MACHINES 9

Principles of operation and characteristics of DC machines. Transformers (single and three phase), Synchronous machines , three phase and single phase induction motors.

UNIT IV ELECTRONIC DEVICES & CIRCUITS 9

Types of Materials –Silicon & Germanium- N type and P type materials – PN Junction –Forward and Reverse Bias –Semiconductor Diodes –Bipolar Junction Transistor – Characteristics – transistor as an Amplifier –Introduction to operational Amplifier –Inverting Amplifier –Non Inverting Amplifier –DAC – ADC .

UNIT V MEASUREMENTS & INSTRUMENTATION 9

Introduction to transducers: pressure, temperature, position, electrical measurements ,Classification of instruments – moving coil and moving iron Ammeter and Voltmeter – multimeters – dynamometer type Wattmeter – three-phase power measurements – energy meter – megger – instrument transformers (CT and PT)

TOTAL : 45 PERIODS

OUTCOMES:

Ability to

- Understand electric circuits and working principles of electrical machines
- Understand the concepts of various electronic devices
- Choose appropriate instruments for electrical measurement for a specific application

REFERENCES

1. Del Toro, "Electrical Engineering Fundamentals", Pearson Education, New Delhi, 2007
2. John Bird, "Electrical Circuit Theory and Technology", Elsevier, First Indian Edition, 2006
3. Allan S Moris, "Measurement and Instrumentation Principles", Elseveir, First Indian Edition, 2006
4. Rajendra Prasad, "Fundamentals of Electrical Engineering", Prentice Hall of India, 2006

5. Thereja .B.L., “Fundamentals of Electrical Engineering and Electronics”, S. Chand & Co. Ltd., 2008
6. V.K Mehta and Rohit Mehta, “Principle of Electrical Engineering”, S. Chand & Company, 2008

AT7302 TECHNOLOGY OF FABRIC FORMATION L T P C
3 0 0 3

OBJECTIVE:
To enable the students to understand the preparation for weaving and various functions of weaving machine

UNIT I PREPARATION OF YARN FOR WEAVING 9
Principles of winding and winding machines; yarn clearing and process control.

UNIT II PREPARATION OF BEAM FOR WEAVING 9
Types of warping and machines; sizing recipe and sizing application; drawing and denting

UNIT III SHEDDING 9
Looms – types, basic motions; shedding mechanisms for shuttle and shuttles weaving machines

UNIT IV PICKING AND BEAT-UP 9
Principles of weft insertion by shuttle, projectile, jet and rapier; multi-phase weaving systems; Beat-up mechanisms

UNIT V SECONDARY AND AUXILIARY MOTIONS 9
Take-up and let-off motions; warp protectors; warp and weft stop motions; automations; woven fabric defects

TOTAL: 45 PERIODS

OUTCOMES
Upon completion of this course, the student shall
- Understand the concepts of preparation of yarn for weaving
- Understand different motions of loom in fabric formation

REFERENCES
1. Marks R., and Robinson T. C., “Principles of Weaving”, The Textile Institute, Manchester, 1989, ISBN: 0900739797 | ISBN-13: 9780900739798
2. Talukdar M. K., Sriramulu P. K., and Ajgaonkar D. B., “Weaving: Machines, Mechanisms, Management”, Mahajan Publishers, Ahmedabad, 1998, ISBN: 81-85401-16-0
3. Lord P. R., and Mohamed M. H., “Weaving: Conversion of Yarn to Fabric”, Merrow, 1992, ISBN: 1855734834 | ISBN-13: 9781855734838
4. Ormerod A., and Sondhelm W. S., “Weaving: Technology and Operations”, The Textile Institute, 1998,ISBN: 187081276X | ISBN-13: 9781870812764.
5. Ajgaonkar D. B., Talukdar M.K., and Wadekar., “Sizing – Materials, Methods and Machines”, 2nd Edition, Mahajan Publishers, Ahmedabad. 1999
6. “Weaving: The Knowledge in Technology”, Proceedings of Weaving Conference 1998, Textile Institute, ISBN: 18770372182
7. Booth J. E., “Textile Mathematics”, Volume 3, The Textile Institute, Manchester, 1977, ISBN: 090073924X | ISBN-13: 9780900739248.
8. John A. Iredale., “Yarn Preparation: A Hand Book”, Textile Institute, Manchester, 1992,ISBN: 1853390429 | ISBN-13: 9781853390425
9. Vangheluwe L., “Air- Jet Weft Insertion”, Textile Progress, Vol. 29, No. 4, The Textile Institute, 2000, ISBN: 1870372255 | ISBN-13: 9781870372251
10. Lunenschloss J., and Albrecht W., “Non-Woven Bonded Fabrics”, Ellis Harwood Ltd, New York, 1985,ISBN: 0853126364 | ISBN-13: 9780853126362
11. “Weaving: The Knowledge in Technology”, The Textile Institute, Manchester, 1998, ISBN:

1870372182 | ISBN-13: 9781870372183

AT7303 TECHNOLOGY OF SPINNING PROCESSES L T P C
4 0 0 4

OBJECTIVE:
To enable the students to understand various processes involved in conversion of fibre to yarn by ring spinning system and other modern spinning systems.

UNIT I OPENING AND CLEANING 12
Linear density systems for textile materials; Ginning – objectives, types, working principle and ginning performance on yarn quality; opening and cleaning – objectives of blow room machines, principle and description of opening, cleaning and blending machines, contamination clearers and safety devices; chute feed system

UNIT II CARDING AND DRAWING 12
Carding – objectives, principles of carding, working of carding machine; drawing machine– objectives, drafting system – types and applications, , principles of auto levellers

UNIT III COMBING AND ROVING 12
Comber preparation – objectives, principles of sliver lap ribbon lap and super lap formers; comber - principle of combing, sequence of combing operation; roving machine – objectives, working principle and operation

UNIT IV RING SPINNING AND YARN PLYING 12
Ring spinning machine – objectives, working principle and operation; condensed yarn spinning – principles, types, merits; two-folding of yarns –package preparation, working principle, resultant count calculation; fancy yarn – types, method of production and applications

UNIT V NEW SPINNING PROCESS 12
Principles of yarn formation – rotor, friction, air vortex and air-jet spinning machines; , core, wrap, spinning system

TOTAL: 60 PERIODS

OUTCOMES
Upon completion of this course, the student shall understand
- Process sequence for producing different types of yarns
- Principle of machines used for production of yarn

REFERENCES

1. Klein W., “The Rieter Manual of Spinning, Vol.1”, Rieter Machine Works Ltd., Winterthur, 2014, ISBN 10 3-9523173-1-4 / ISBN 13 978-3-9523173-1-0.
2. Klein W., “The Rieter Manual of Spinning, Vol.2”, Rieter Machine Works Ltd., Winterthur, 2014, ISBN 10 3-9523173-2-2 / ISBN 13 978-3-9523173-2-7.
3. Klein W., “The Rieter Manual of Spinning, Vol.3”, Rieter Machine Works Ltd., Winterthur, 2014, ISBN 10 3-9523173-3-0 / ISBN 13 978-3-9523173-3-4Klein W., and Stalder H., “The Rieter Manual of Spinning, Vol.4”, Rieter Machine Works Ltd., Winterthur, 2014, ISBN: 10 3-9523173-4-9 / ISBN: 13 978-3-9523173.
4. Ernst H., “The Rieter Manual of Spinning, Vol.5”, Rieter Machine Works Ltd., Winterthur, 2014, ISBN: 10 3-9523173-5-7 / ISBN: 13 978-3-9523173-5-8
5. Stalder H., “The Rieter Manual of Spinning, Vol.6”, Rieter Machine Works Ltd., Winterthur, 2014, ISBN: 10 3-9523173-6-5 / ISBN: 13 978-3-9523173-6-5.
6. Thomas Weide, “The Rieter Manual of Spinning, Vol.7”, Rieter Machine Works Ltd., Winterthur, 2014, ISBN: 10 3-9523173-7-3 / ISBN: 13 978-3-9523173-7-2.
7. Oxtoby E., “Spun Yarn Technology “, Butterworth, London, 1987, ISBN: 0408014644 | ISBN-13: 9780408014649
8. Lord P. R., “Yarn Production: Science, Technology and Economics”, The Textile Institute,

Manchester, 2003, ISBN: 1855736969 | ISBN-13: 9781855736962
9. Doraiswamy I., Chellamani P., and Pavendhan A., “Cotton Ginning, Textile Progress”, The Textile Institute, Manchester, 1993, ISBN: 1870812484 / ISBN: 978-1870812481.
10. Salhotra K. R., and Ishtiaque S. M., “Rotor Spinning; its Advantages”, Limitations and Prospects in India, ATIRA, Ahmedabad, 1995
11. Trommer G., “Rotor Spinning”, Meliand Textile benchte GmbH, Rohrbacher, 1995, ISBN: 3871505099 | ISBN-13: 9783871505096
12. Lawerence C. A., and Chen K. Z., “Rotor Spinning”, Textile Progress, The Textile Institute, Manchester, 1984, ISBN : 0900739681 / ISBN: 978-0900739682

TT7351 CHARACTERISTICS OF TEXTILE FIBRES **L T P C**
4 0 0 4

OBJECTIVES:
To enable the students to understand the
- Structure and morphology of textile fibres
- Physical characteristics textile fibres

UNIT I STRUCTURE OF FIBRES **12**
Classification of fibres; study of morphological structures of fibers; physical properties of fibres. order and disorder in fibre structure; molecular conformations – planar zig-zag, helical, lamellar, and sphrulite conformations.

UNIT II STRUCTURE INVESTIGATION TECHNIQUES **6**
Transmission and Scanning electron microscopes-principle; construction and working; X-ray diffraction techniques – estimation of crystallinity; Infrared radiation and dichroism techniques; chemical element and group identification by transmittance and optical density methods, molecular orientation estimation

UNIT III MOISTURE ABSORPTION CHARACTERISTICS **12**
Theories of moisture sorption; Moisture absorption behavior of natural and man-made fibres; influence of fibre structure, humidity and temperature on the moisture absorption; conditioning of fibres –mechanism of conditioning and factors influencing conditioning. Moisture diffusion in fibres. Heat of sorption – integral and differential, their relation; factors influencing heat of sorption - measurement of heat of sorption

UNIT IV TENSILE AND ELONGATION CHARACTERISTICS OF FIBRES **18**
Tensile characteristics –study of strength, elongation, work of rupture, initial modulus, work factor and yield point – determination of yield point. Stress-strain relations of natural and manmade fibres - influence of fibre structure, humidity and temperature on tensile characteristics. Time effects-Study of creep phenomena. Elastic recovery and its relation to stress and strain of fibres; mechanical conditioning of fibres and its influence on elastic recovery. Load cycling and extension cycling-their effect on elastic recovery. Introduction about torsional and flexural rigidity of fibers

UNIT V OPTICAL, FRICTIONAL, AND THERMAL CHARACTERISTICS **12**
Reflexion and Lustre-objective and subjective methods of measurement - refractive index and its measurement - birefringence, factors influencing birefringence - Absorption and dichroism
Friction – static, limiting and kinetic friction, its measurement, comparison of fibres, directional friction in wool – friction. Thermal transitions of fibres - thermal conductivity, thermal expansion and contraction, Tg, melting; static electricity in textile fibres

TOTAL:60 PERIODS

OUTCOME:
Upon completion of this course, the student shall be able to
- Correlate the physical properties of fibre to its microstructure and its influence on other characteristics
- Choose appropriate fibre for the required property

REFERENCES:

1. Morton W. E., and Hearle J. W. S., “Physical Properties of Textile Fibres”, The Textile Institute, Washington D.C., 2008, ISBN 978-1-84569-220-95
2. Meredith R., and Hearle J. W. S., “Physical Methods of Investigation of Textiles”, Wiley Publication, New York, 1989, ISBN: B00JCV6ZWU | ISBN-13:
3. Mukhopadhyay S. K., “Advances in Fibre Science”, The Textile Institute,1992, ISBN: 1870812379
4. Meredith R., “Mechanical Properties of Textile Fibres”, North Holland, Amsterdam, 1986, ISBN: 1114790699, ISBN-13: 9781114790698
5. Hearle J. W. S., Lomas B., and Cooke W. D., “Atlas of Fibre Fracture and Damage to Textiles”, The Textile Institute, 2nd Edition, 1998, ISBN: 1855733196
6. Raheel M. (ed.)., “Modern Textile Characterization Methods”, Marcel Dekker, 1995, ISBN:0824794737
7. Mukhopadhyay. S. K., “The Structure and Properties of Typical Melt Spun Fibres”, Textile Progress, Vol. 18, No. 4, Textile Institute, 1989, ISBN: 1870812115
8. Hearle J.W.S., “Polymers and Their Properties : Fundamentals of Structures and MechanicsVol 1”, Ellis Horwood, England, 1982, ISBN: 047027302X | ISBN-13: 9780470273029
9. Greaves. P. H., and Saville B.P., “Microscopy of Textile Fibres”, Bios Scientific, U.K., 1995, ISBN: 1872748244 | ISBN-13: 9781872748245
10. Seville. B. P., “Physical Testing of Textiles”, Woodhead Publishing, 1999,ISBN: 1855733676 | ISBN-13: 9781855733671
11. Hearle J. W. S., and Peters. R. H., “Fibre structure”, Elsevier Ltd, 1963, ISBN: 1483212211 | ISBN-13: 9781483212210

AT7301 FUNDAMENTALS OF GARMENT MANUFACTURING **L T P C**
2 0 0 2

OBJECTIVES:

To introduce briefly the fundamentals of garment manufacture to the students

UNIT I **12**

Introduction to Indian apparel industry; Anthropometry, Specification sheet, technical pack;
Pre production planning - spreading, cutting, marker; types of samples and sample approval; garment accessories

UNIT II **12**

Stitch types and uses; seam types and uses; stitch and seam identification; sewing threads; sewing machinery and working aids

UNIT III **6**

Trims and components; fusing material, types of fusing; pressing and packing

TOTAL: 30 PERIODS

OUTCOMES

Upon completion of this course, the students shall understand fundamental aspects of production of garment and various processes involved

REFERENCES

1. Richard M. Jones., “The Apparel Industry”, Blackwell Science, U.K., 2006, ISBN: 1405135999 | ISBN-13: 9781405135993
2. Kantilal Ila., “Apparel Industry in India”, NICTAS Publication, Ahmedabad, 1990,ISBN: 8185472009 | ISBN-13: 9788185472003
3. Harrold Carr., and Barbara Latham., “The Technology of Clothing Manufacture”Backwell Science,U.K., 1994,ISBN: 0632037482 | ISBN-13: 9780632037483
4. Gerry Cooklin., Steven George Hayes., and John McLoughlin., “Introduction to Clothing Manufacture”, Wiley-Blackwell Science, U.K., 2006, ISBN: 0632058463 | ISBN-13: 9780632058464

5. Raj kishore Nayak., and Rajiv Pandhya.,"Garment Manufacturing Technology", Woodhead publications 2015, ISBN: 1782422323 | ISBN-13: 9781782422327
6. ChutterA. J., "Introduction to Clothing Production Management", Wiley-Blackwell Science, U.K., 1995, ISBN: 0632039396 | ISBN-13: 9780632039395
7. Harold Carr, "The Clothing Factory", Clothing and Footwear Institute, 1972.ISBN: B0012PP566.
8. Miller E., "Textile Properties and Behaviour in Clothing use", Batsford Publication, 1992, ISBN: 0713472359 | ISBN-13: 9780713472356
9. Cooklin G., "Fusing Technology", The Textile Institute, Manchester, 1990, ISBN: 1870812204 | ISBN-13: 9781870812207
10. Jay Diamond., "Fashion Apparel and Accessories", Delmar Publication, 1994, ISBN: 0827356242 | ISBN-13: 9780827356245

EE7261	ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY	L T P C 0 0 4 2

OBJECTIVE:
To train the students in performing various tests on electrical drives, sensors and circuits.

LIST OF EXPERIMENTS:
1. Load test on separately excited DC shunt generator
2. Load test on DC shunt moor
3. Load test on S Transformer
4. Load test on Induction motor
5. Regulation of 3 Alternator
6. Study of CRO
7. Logic gates
8. Operational amplifiers
9. Time constant of RC circuit
10. Characteristics of LVDT
11. Calibration of Rotometer
12. RTD and Thermistor
13. Flapper Nozzle system

TOTAL : 60 PERIODS

AT7312	TEXTILE MANUFACTURING LABORATORY	L T P C 0 0 2 1

OBJECTIVES:
To enable the students to
- Get practical experience in the yarn spinning, weaving preparatory and weaving machines
- Learn material passage and identify the parts of machines of spinning and weaving machines

LIST OF EXPERIENTS
Material passage and production calculation in
1. Ginning, scutcher
2. Carding machine
3. Comber
4. Draw frame
5. Speed frame
6. Material passage, draft, twist and production calculation in ring frame
7. Material passage and production calculation in rotor spinning machine
8. Material passage and production calculation in winding machine
9. Timing diagram of weaving machine

10. Shedding mechanisms - Tappet, dobby
11. Jacquard mechanism
12. Picking mechanism and calculation of shuttle speed
13. Beat-up mechanism and loom timing of primary motion
14. Let-off and take-up mechanism
15. Auxiliary mechanisms

TOTAL: 30 PERIODS

OUTCOMES:

Upon completion of this practical course, the students shall be able to

- Understand the material passage in the machine, draw gearing diagram, identify the components of spinning and weaving machines
- Calculate draft, twist and production rate of spinning machines
- Understand the mechanism of weaving machine

AT7311 BASIC SEWING LABORATORY L T P C
0 0 2 1

OBJECTIVES:

To enable the students to get practical experience in sewing machine

LIST OF EXPERIMENTS

1) Identification of sewing machine components and understanding their functions

2) Basics of sewing settings
   - Needle fixing and threading in
     Single needle, double needle, over-lock and feed-of the-arm machine
   - Pedal and knee lifter operations practice
   - Winding the bobbin thread –adjusting the bobbin thread tension.
   - Adjusting the stitch length, needle thread tension nut, pressure of presser foot, feed-dog, thread take-up spring and needle thread take-up lever

3) Sewing exercise on paper
   - Exercise 1-Parallel line
   - Exercise 2 -Corners
   - Exercise 3 -Concentric squares
   - Exercise 4 -Curves
   - Exercise 5 –Concentric curves

4) Stitching exercise on fabric panels
- Exercise 1-Parallel line
- Exercise 2 -Corners
- Exercise 3 -Concentric squares
- Exercise 4 -Curves
- Exercise 5 –Concentric curves

TOTAL: 30 PERIODS

OUTCOMES:

Upon completion of this practical course, the student shall be able to

- Indentify the machine components and understand the function of elements of sewing machine
- Understand the basic sewing operations
- Sew on fabric panels

CH7351 SOLID MECHANICS FOR TECHNOLOGISTS L T P C
3 0 0 3

AIM

To give the students the knowledge on structural, Mechanical properties of Beams, columns.

OBJECTIVES

- The students will be able to design the support column, beams, pipelines, storage tanks and reaction columns and tanks after undergoing this course. This is precursor for the study on process equipment design and drawing.

UNIT I STRESS, STRAIN AND DEFORMATION OF SOLIDS 9

Rigid bodies and deformable solids – forces on solids and supports – equilibrium and stability – strength and stiffness – tension, compression and shear stresses – Hooke's law and simple problems – compound bars – thermal stresses – elastic constants and poission's ratio.

UNIT II TRANSVERSE LOADING ON BEAMS 9

Beams – support conditions – types of Beams – transverse loading on beams – shear force and bending moment in beams – analysis of cantilevers, simply – supported beams and over hanging beams – relationships between loading, S.F. and B.M. In beams and their applications – S.F.& B.M. diagrams.

UNIT III DEFLECTIONS OF BEAMS 9

Double integration method – Macaulay's method – Area – moment theorems for computation of slopes and deflections in beams.

UNIT IV STRESSES IN BEAMS 9

Theory of simple bending – assumptions and derivation of bending equation (M/I = F/Y = E/R) – analysis of stresses in beams – loads carrying capacity of beams – proportioning beam sections – leaf springs – flitched beams – shear stress distribution in beams – determination of shear stress in flanged beams.

UNIT V TORSION AND COLUMNS 9

Torsion of circular shafts – derivation of torsion equation (T/J = fs/R = Cθ/L) – stress and deformation in circular and hollow shafts – stresses and deformation in circular and hollow shafts – stepped shafts – shafts fixed at both ends – stresses in helical springs – deflection of springs – spring constant. Axially loaded short columns – columns of unsymmetrical sections – Euler's theory of long columns – critical loads for prismatic columns with different end conditions – effect of eccentricity.

TOTAL : 45 PERIODS

OUTCOMES:

- Solve the problems related to the structural components under various loading conditions

TEXT BOOKS

1. Junarkar S.B., "Mechanics of Structure Vol. 1, 21st Edition", Character Publishing House, Anand, India, 1995
2. William A. Nash, 'Theory and Problems of Strength of Materials", Schaum's Outline Series, McGraw Hill International Editions, Third Edition, 1994
3. Bansal, R.K, "Strength of Materials", Laxmi Publications (P) Ltd., Fourth Edition, 2010

REFERENCES

1. Elangovan A., 'Thinma Visai Iyal (Mechanics of Solids in Tamil)", Anna University, Chennai, 1995.

AT7401 GARMENT CONSTRUCTION L T P C
3 0 0 3

OBJECTIVES:

To enable the students to understand the process of garment construction

UNIT I LAYING, MARKING AND CUTTING 9

Basics of fabric spreading, modes of spreading, different fabric packages and un winding methods, spreading tension, uniformity and alignment, woven fabric lay, knitted fabric lay, types of fabric lay, lay planning principles; marker making, principles of marker making, types of markers, marker planning and marker efficiency, and fabric design parameters on markers, matching, bias and grain line; fabric cutting methods, latest fabric cutting equipments, and record keeping in cutting room, advancements in cutting room technology

UNIT II SEAMS AND STITCHES 13

Seam types and classes; stitch types, machine elements in sewing, sewing threads- types and characteristics, stitch parameters, sewing defects

UNIT III GARMENT COMPONENTS AND ITS STYLINGS 5

Ladies, men's and children's dress wear - collars, sleeves, cuffs, pleats, gatherings and darts, pockets, welts, yoke; purpose of darts and dart equivalents; children's dresses, innerwear and lingerie; balance and symmetry in garment construction

UNIT IV STYLES AND OPERATION BREAKDOWN 13

Operation break down for shirts, trousers, blouses, jackets, dresses; material flow and assembly of garments, machinery and work force allocation

UNIT V PRODUCTION PROCESSES 5

Production line set up, line balancing, production systems - full garment assembly, make through, batch production, progressive bundle, straight line assembly, unit production system, modular production system

TOTAL: 45 PERIODS

COURSE OUTCOMES

Upon completion of this course, the students shall

- Understand various process involved in garment construction
- Know operation breakdown for different styles of garments
- Know different apparel production systems

REFERENCES

1. Jacob Solinger., "Apparel Production Handbook", Reinhold Publications,1998, ISBN: 1879570009 / ISBN: 978-1879570009
2. Carr H., and Latham B., "The Technology of Clothing Manufacturing", Blackwell Science, U.K.,1994, ISBN: 0632037482 | ISBN-13: 9780632037483
3. Ruth E. Glock., and Grace I. Kunz., "Apparel Manufacturing, Sewn Product Analysis", fourth edition, Pearson Education,2004, ISBN: 0131119826 ISBN-13: 9780131119826.
4. Laing R.M., and Webster J., "Stitches & Seams", The Textile Institute, India,1999, ISBN: 1870812735 | ISBN-13: 9781870812733
5. Shaeffer Claire., "Sewing for the Apparel Industry", Prentice Hall, New Jersey, 2001, ISBN: 0321062841 | ISBN-13: 9780321062840
6. Singer., "Sewing Lingerie", Cy De Cosse Incorporated, 1991,ISBN: 0865732604 | ISBN-13: 9780865732605
7. Patty Brown., and Janett Rice., "Ready-To-Wear Apparel Analysis'", Third Edition, Prentice-Hall Inc., New Jersey, 2000, ISBN: 0130254347 | ISBN-13: 9780130254344
8. Johes I., and Styles G.K., "Joining Textiles Principles and Application", Wood head Publications Pvt. Ltd 2013, ISBN: 1845696271 | ISBN-13: 9781845696276

AT7451 INTRODUCTION TO PATTERN ENGINEERING L T P C
3 0 0 3

OBJECTIVES:

- To introduce students the human anthropometrics from the scientific and technological viewpoint
- To equip students with comprehensive pattern making skills

UNIT I BASICS OF ANTHROPOMETRICS AND SIZING SYSTEM 9

Anthropometry measurements, human anatomy, landmark terms, perception of body appearance, its relation to clothing, clothing sizing systems, illusions created by clothing, body ideals-Eight head theory, body proportions, height and weight distribution.

UNITII BODY MEASUREMENTS AND PATTERN TERMINOLOGIES 9

Important body measurements across all age groups, methods of measuring body dimensions, standard measurement chart-designation and control dimensions. Functions of pattern making tools, preparation of dress form , pattern grain line, balance line terms, notches, seam allowance, jog seam, dart points, pleats, flares, gather and true bias, truing, blending.

UNIT III DRAFTING 9

Types of pattern making - drafting and draping methods; principles of pattern making, pattern details; basic blocks for men and women

UNIT IV PATTERNS FOR COLLARS AND SLEEVES 9

Collar classification and terms, basic shirt collar, peter pan collar, sailor collar, mandarin collar, built-up neck lines, cowls, sleeve cap, sleeve cuffs, puff, petal, lantern and leg-of-mutton sleeves

UNIT V FLAT PATTERN TECHNIQUES 9

Dart manipulation- single dart series-slash-spread technique, pivotal transfer technique; two dart series-slash spread and pivotal transfer technique; graduated and radiating darts; parallel, asymmetric and intersecting darts; types of added fullness and contouring principle

TOTAL: 45 PERIODS

OUTCOMES:

On completion of this course, the students shall have knowledge on

- Clothing sizing system
- Methods of body measurements
- Drafting and pattern preparation

REFERENCES

1. Fan J., Yu W., and Hunter L., “Clothing Appearance and Fit: Science and Technology”, Wood head Publishing Limited, 2004, ISBN: 1855737450 | ISBN-13: 9781855737457
2. Ashdown S., “Sizing in Clothing”, Wood head Publishing Limited, 2007, ISBN: 1845690346 | ISBN-13: 9781845690342
3. Helen Joseph Armstrong., “Patternmaking for Fashion Design”, Pearson Education Pvt Ltd., 2005,ISBN: 067398026X | ISBN-13: 9780673980267
4. Winifred Aldrich., “Metric Pattern Cutting for Children’s Wear and Baby Wear”, Blackwell Publishing, 2009, ISBN: 140518292X | ISBN-13: 9781405182928

AT7402 KNIT FABRIC PRODUCTION L T P C
2 0 0 2

OBJECTIVES:

To make the students understand fundamentals of knitting and types of knitting processes

Attested

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UNIT I INTRODUCTION 3

Reasons for the growth of the knitting industry; comparison of fabric properties - woven, knitted and bonded fabrics; classification of knitting processes – weft knit & warp knit; yarn quality requirements for knitting

UNIT II FUNDAMENTALS OF KNITTING 6

General definitions and principles of knitting; types of knitting needles – Bearded, Latch & Compound needle; elements of knitted loop structure

UNIT III WEFT KNITTING 15

Basic weft knitted structures and their production - plain, rib, interlock and purl; fundamentals of formation of knit, tuck and float stitches; factors affecting the formation of loop; effect of loop length and shape on fabric properties; analysis of various types of weft knitted structure; production of various weft knitted structures using flat knitting machines; weft knitted fabric defects

UNIT IV WARP KNITTING 6

Basic principles; elements of warp knitted loop – open and closed laps; tricot and raschel warp knitting machines; warp knitted fabrics – structures and end uses; warp knitted fabric defects

TOTAL: 30 PERIODS

OUTCOMES:

Upon completion of this course, the student shall be able to understand the principle of knitting in different types of knitting machines and knitted fabric defects

REFERENCES

1. Ajgaonkar D.B., “Knitting technology”, Universal Publishing Corporation, Mumbai, 1998, ISBN: 0818502738 / ISBN: 9780818502736
2. Chandrasekhar Iyer, Bernd Mammel and Wolfgang Schach., “Circular Knitting”, Meisenbach GmbH, Bamberg, 1995, ISBN: 3-87525-066-4.
3. Spencer D.J., “Knitting Technology”, III Ed., Textile Institute, Manchester, 2001, ISBN: 1 85573 333 1.
4. Samuel Raz., “Flat Knitting: The new generation”, Meisenbach GmbH, Bamberg, 1997, ISBN: 3-87525-054-0.
5. Samuel Raz., “Warp Knitting production”, Melliand Textilberichte, GmbH, Rohrbacher, 1987, ISBN: 3-87529-022-4

AT7403 TEXTILE CHEMICAL PROCESSING I L T P C

3 0 0 3

OBJECTIVE:

To enable the students to learn about pre-treatments involved in the wet processing of textiles, dyeing and printing of textiles

UNIT I 5

Operation sequence in chemical processing of cotton, silk, wool, rayon, polyester, polyamide, polyester and cellulosic blend materials with emphasis on the objectives of each operation

UNIT II 9

Scouring; bleaching and mercerization of cotton; preparatory process for wool and silk

UNIT III 9

Stages involved in dying process, principle of application of direct, reactive, vat, acid, disperse and natural dyes; principles of working of loose fibre, yarn and fabric processing machines

UNIT IV 13

Printing methods and styles of printing; general constitution of printing paste, printing with pigments, principles of transfer and ink-jet printing, dyeing and printing faults, assessment of fastness properties of dyed and printed goods

UNIT V **9**

Fundamentals of colour science, assessment of colour of dyed and printed goods; basics of colour matching technique; assessment of whiteness and yellowness indices and colour difference; pass/fail decision making.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of this course, the student shall have the knowledge on

- Necessity and requirements of pre-treatments in wet processing of textiles
- Dyeing and printing of textile materials
- Fundamentals of colour science and assessment of colour of coloured goods

REFERENCES

1. Trotman E. R., "Dyeing and Chemical Technology of Textile Fibres", B.I Publishing Pvt. Ltd., New Delhi, 1994, ISBN: 0471809101 | ISBN-13: 9780471809104
2. Karamkar S.R., "Chemical Technology in Pre-treatment processes of Textiles", Elsevier Publications, Newyork,1999, ISBN: 044450060X | ISBN-13: 9780444500601
3. Shenai V. A., "Chemistry of Dyes and Principles of Dyeing", Sevak Publications, Mumbai, 1995, ISBN: B0007BFE9Y.
4. Clark M. (Ed.), "Handbook of Textile and Industrial dyeing Vol. 1: Principles and Types of dyes", Woodhead Publishing India Pvt. Ltd., New Delhi 2011, ISBN: 1845696956 | ISBN-13: 9781845696955
5. Mittal R.M. and Trivedi S.S., "Chemical Processing of Polyester/Cellulosic Blends", Ahmedabad Textile Industry's Research Association, 1983, ISBN: B0007B561K
6. Bhagwat R. S., "Handbook of Textile Processing", Colour Publication, Mumbai. 1999.
7. Shenai V. A., "Technology of Printing", Sevak Publications, Mumbai, 1996
8. Miles W. C., "Textile Printing", Wood head Publication, 2003, ISBN 0 901956 76 1
9. Johnson A., "The Theory of Colouration of Textiles", SDC, Second edition, 1989,ISBN 0 901956 481
10. Shah H. S., and Gandhi R. S., "Instrumental Colour Measurement and Computer Aided Colour Matching for Textiles", Mahajan Book Publication, 1990, ISBN: 8185401004 / ISBN: 9788185401003
11. Choudhury A.K.R.," Modern concepts of colour and Appearance", Oxford and IBH publishing Ltd., 2000, ISBN: 1578080789 | ISBN-13: 9781578080786

TT7451 WOVEN FABRIC STRUCTURE **L T P C**
3 0 0 3

OBJECTIVES:

To enable the students to learn about different structures of woven fabric and design the structure for different applications

UNIT I **9**

Basic weaves – plain, twill, satin, sateen and their derivatives – loom requirements

UNIT II **9**

Ordinary and Brighten Honey Comb; Huck-a-Back and its modifications; Mock Leno; crepe weaves; colour theory – light and pigment theory; modification of colour; application of colours; colour and weave effects – loom requirements

UNIT III **13**

Bedford cords - plain and twill faced, wadded; welts and piques, wadded piques; backed fabrics - warp and weft, reversible and non-reversible fabrics; extra warp and extra weft figuring - single and double colour – loom requirements

UNIT IV **9**

Pile fabrics; warp pile - wire pile, terry pile, loose backed; weft pile – plain back and twill back velveteen, lashed pile, corduroy, weft plush – loom requirements

UNIT V **5**

Double cloth, types of stitches; Damasks; Gauze and Leno principles – loom requirements; 3Dfabrics

TOTAL: 45 PERIODS

OUTCOMES:

Upon the completion of this course the student will be able to

- Understand different structures of woven fabric
- Design the structure for different end uses
- Construct the draft and peg-plan which are required to convert the design into fabric

REFERENCES

1. GrosickiZ. J., "Watson's Textile Design and Colour", Vol.1, Wood head Publications, Cambridge England, 2004, ISBN: 1 85573 7701 24.
2. Grosicki Z. J., "Watson's Advanced Textile Design and Colour", Vol. II, Butterworths, London, 1989, *ISBN*-9781855739963
3. Wilson J., "Handbook of Textile Design", Textile Institute, Manchester, 2001, ISBN: 1 85573 5733.
4. Horne C.E., "Geometric Symmetry in Patterns and Tilings", Textile Institute, Manchester, 2000, ISBN: 1 85573 4923.
5. Seyam A. M., "Structural Design of Woven Fabrics, Theory and Practice", Textile Institute, Manchester, 2002, ISBN: 1 87037 2395.
6. Georner D., "Woven Structure and Design, part 1: Single Cloth Construction", WIRA, U.K., 1986, ISBN: 0900820179 | ISBN-13: 9780900820175
7. Georner D., "Woven Structure and Design, Part 2: Compound Structures", WIRA, U.K., 1989, ISBN: 090366951X | ISBN-13: 9780903669511
8. Jan Shenton., "Woven Textile Design", Laurence King Publishing, 2014, ISBN: 178067337X | ISBN-13: 9781780673370

AT7411 PATTERN MAKING LABORATORY **L T P C**
0 0 4 2

OBJECTIVES:

To enable the students to practically carryout pattern making for men, women and children garments

LIST OF EXPERIMENTS

1. Measuring the Form – Male, female and child.
2. Formulating standard measurement chart.
3. Drafting the basic pattern set using the above measurement chart.
4. Drafting patterns for different types of sleeves
5. Drafting patterns for different types of collars
6. Single dart series slash spread technique, pivotal transfer technique
7. Double dart series slash spread technique, pivotal transfer technique
8. Graduated and radiating darts.

OUTCOMES:

Upon completion of this practical course, the students shall know about

- Patterns with seam and cutting allowance for men, women and children garments
- Method of solving fitting problems in patterns
- Different draping techniques

Attested

TOTAL: 60 PERIODS

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TT7461 FABRIC ANALYSIS LABORATORY L T P C
0 0 4 2

OBJECTIVES:
To enable the students to analyse different fabrics for structure and constructional details

LIST OF EXPERIMENTS

1. Visualization of commercially available woven, knitted and nonwoven fabrics
2. Analysis of construction details of the following fabric structure
   - i. Plain and its derivatives
   - ii. Twill and its derivatives
   - iii. Satin (Regular and irregular)
   - iv. Sateen (Regular and irregular)
   - v. Honeycomb (ordinary and Brighton)
   - vi. Huck-a-back
   - vii. Extra warp and extra weft figuring
   - viii. Pile fabrics (warp and weft)
   - ix. Backed fabrics
   - x. Gauze and Leno
   - xi. Double cloth
   - xii. Crepe
   - xiii. Tapestry
   - xiv. Mock-leno
   - xv. Bedford cord.
   - xvi. Single jersey
   - xvii. Double jersey structures
3. Analysis of blend composition in the yarn of the fabric
4. Analysis of finish on the fabric

TOTAL:60 PERIODS

OUTCOMES:
Upon completion of this practical course, the student will be able to

- Analyse the fabric and determine the constructional details
- Draw design, draft and peg plan of the structure of the fabrics

AT7552 GARMENT PRODUCTION MACHINERY L T P C
3 0 0 3

OBJECTIVE:
To acquaint students of the basic production machinery and equipments used in garment construction

UNIT I FABRIC INSPECTION, SPREADING AND CUTTING MACHINES 13
Fabric inspection machinery; spreading machines – manual, semi automatic and fully automatic machines; mechanism of straight knife, rotary, band knife, die, laser, plasma, water jet and ultra sonic cutting machines; notches, drills and thread markers; computer interfaced cutting machines; fusing and molding machines; safety measures

UNIT II SEWING MACHINES 14
Lock stitch and chain stitch sewing machine – types, driving arrangement, function of elements, stitch formation, timing, settings and feed mechanism; needles-geometry and types; selection of machine and process parameters for different applications; Button fixing and button holing machine; safety measures

UNIT III MULTI THREAD SEWING MACHINES 13
Overlock, flatlock, feed-off the arm, zig-zag and embroidery machines– driving arrangement, function of elements, stitch formation, timing, settings and feed mechanism; safety measures

UNIT IV FINISHING MACHINES 5
Pressing machineries – buck pressing, iron pressing, block or die pressing, form pressing, steamers; folding and packing machines; safety measures

OUTCOMES:
Upon completion of the course, the students would understand

- Fundamental principle and working of machines used for spreading and cutting
- Different types of basics sewing, multithread sewing, and finishing machines used for garment manufacture

TOTAL: 45 PERIODS

REFERENCES

1. Harold Carr., and Barbara latham., "The Technology of Clothing Manufacture", 4th Edition, Whiley-Black well Sciences, 2008, ISBN: 1405161981 / ISBN: 978-1405161985
2. Jacob Solinger., "Apparel Manufacturing Handbook", 2nd Edition Bobbin Blenheim Media Corp, 1988, ISBN : 1879570009 / ISBN: 978-1879570009
3. Ruth E. Glock., and Grace I. Kunz., "Apparel Manufacturing Sewn Product Analysis", 4th Edition, Pearson Prentice Hall, 2005, ISBN: 0131119826 | ISBN-13: 9780131119826
4. Villumsone-Nemes I., "Industrial Cutting of Textiles material", Wood head Publications Pvt. Ltd 2012, ISBN: 978-1-85709-134-5
5. Jelka Gersak., "Design of Clothing Manufacture Process - A Systematic Approach to Planning Scheduling and Control", Wood head Publications Pvt. Ltd, 2013, ISBN: 978-1-85709-778-1

AT7551 ADVANCED PATTERN ENGINEERING L T P C
3 0 0 3

OBJECTIVES:
To enable the students to develop better understanding on pattern construction, grading and pattern alteration techniques to provide good fit

UNIT I FOUNDATIONS FOR TOPS 9
Basic shirt foundation-front bodice draft, back bodice draft, sleeve draft, adding seam allowance and pattern information; kimono, raglan foundation; pattern for princess line foundation, strapless princess bodice foundation

UNIT II FOUNDATIONS FOR BOTTOM WEAR 9
pant foundation - front and back, waist band; jean foundation, pant derivatives;

UNIT III PATTERNS FOR POCKET, PLACKET AND FACINGS 6
Pocket classification, plackets; facing patterns for cut-out necklines and armholes

UNIT IV PATTERNS FOR KNITS, ACTION WEAR AND SWIMWEAR 12
Knit top foundations, bodysuit foundations and variations; swimwear–maillot, bikini, little-boy, and full-figure swim foundations; pattern for bias-cut dresses;

UNIT V PATTERN ALTERATIONS AND GRADING 9
Pattern alteration - fit for bodice, trouser and skirt; grading process, grade rules and types of grading system

OUTCOMES:
Upon completion of the course, the students shall have knowledge on the

- Pattern making with respect to sleeves, collar and pockets
- Foundations for tops and bottom wear construction
- Pattern preparation for knits , swim and action wear
- Pattern alteration and grading

TOTAL: 45 PERIODS

REFERENCES

1. Helen Joseph Armstrong., "Patternmaking for Fashion Design", Pearson Education Pte. Ltd., 2005, ISBN: 067398026X | ISBN-13: 9780673980267

2. Winifred Aldrich., “Metric Pattern Cutting for Children’s Wear and Baby Wear”, Blackwell Publishing, 2004, ISBN: 140518292X | ISBN-13: 9781405182928

AT7501 TEXTILE CHEMICAL PROCESSING II **L T P C**
3 0 0 3

OBJECTIVE:
To enable the students to learn about chemical finishing of fabrics and dyeing of garments

UNIT I **13**
Finishing - Calendering, shrink proofing, antistatic finish, softening, water and flame proofing, UV protection, antimicrobial finish, resin finishing – crease recovery, wash and wear and durable press finishes

UNIT II **5**
Standard methods of assessment of all the above finishes

UNIT III **9**
Selection of garment accessories for garment dyeing; preparation of garments for dyeing; garment dyeing machines; physical finishes for garments.

UNIT IV **9**
Selection of dyes and auxiliaries for garment dyeing; printing machines for garments and unconventional printing techniques; washing of denim and other garments, laundering and stain removal.

UNIT V **9**
Eco friendly chemical processes, banned dyes and chemicals, evaluation techniques for assessment of these agents, permissible limits for objectionable agents.

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the students will have knowledge on
- Chemical finishing treatment of textile materials
- Dyeing and printing of garments
- Eco friendly chemical processes

REFERENCES:
1. Hall A.J., “Textile Finishing”, 2nd ed., McGraw Hill, 1995.
2. Marsh J.T., “Introduction to Textile Finishing” Vol. II, New Age, 1996
3. Heywood D.,”Textile Finishing”, Woodhead Publishing Ltd.,2003 ISBN 090195681
4. Shenai V.A., “Technology of Finishing”, Vol. X, Usha, 1998
5. Schindler W.D and Hauser P., “Chemical Finishing of Textiles”, Wood head Publications, ISBN: 1855739054.
6. Yin-Ling Lam , Chi-Wai Kan & Chun-Wah Marcus Yuen, " Developments in functional finishing of cotton fibres – wrinkle-resistant, flameretardant and antimicrobial treatments", Textile Progress, Vol. 44, Nos. 3-4, September-December 2012, 175–249
7. Jones B. W., “Garment Dyeing: Ready to Wear Fashion from the Dyehouse”, Textile Progress, Vol. 19, No. 2, 1988, ISBN 1870812131.
8. Roshan Paul (Ed.), ‘Denim – Manufacture, Finishing and Applications’, Woodhead Publishing, 2015.
9. Reife A. and Freeman H.S., “Environmental Chemistry of Dyes and Pigments”, Wiley, 1996, ISBN: 0471589276

GE7251 ENVIRONMENTAL SCIENCE AND ENGINEERING L T P C
3 0 0 3

OBJECTIVES:

To the study of nature and the facts about environment.

- To find and implement scientific, technological, economic and political solutions to environmental problems.
- To study the interrelationship between living organism and environment.
- To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
- To study the dynamic processes and understand the features of the earth's interior and surface.
- To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 14

Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

Field study of common plants, insects, birds

Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II ENVIRONMENTAL POLLUTION 8

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c)Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards– soil waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides.

Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III NATURAL RESOURCES 10

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.

Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 7

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – role of non-governmental organization- environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – wasteland reclamation – consumerism and waste products – environment production act– Air-

(Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – enforcement machinery involved in environmental legislation- central and state pollution control boards- Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health – Case studies.

TOTAL: 45 PERIODS

OUTCOMES:

Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.

- Public awareness of environment at infant stage.
- Ignorance and incomplete knowledge has lead to misconceptions.
- Development and improvement in standard of living has lead to serious environmental disasters.

TEXT BOOKS:

1. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education 2004.
2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2006.

REFERENCES:

1. R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media.
2. Cunningham, W.P. Cooper, T.H. Gorhani, 'Environmental Encyclopedia',Jaico Publ., House, Mumbai, 2001.
3. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT LTD, New Delhi, 2007.
4. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press 2005.

TT7561 TEXTILE CHEMICAL PROCESSING LABORATORY L T P C
0 0 4 2

OBJECTIVE:

To train the students in pre-treatment, dyeing, printing and testing of textile materials

LIST OF EXPERIMENTS

1. Desizing and scouring of fabric.
2. Peroxide Bleaching of Cotton Yarn/Fabric.
3. Degumming of silk.
4. Identification of dyes.
5. Dyeing of Cotton using Reactive dyes
6. Dyeing of Cotton using Vat dye
7. Dyeing of polyester using disperse dyes.
8. Dyeing of polyester and cotton blend.
9. Determination of wash, light, perspiration and rubbing fastness of dyed fabrics
10. Printing of cotton fabric by direct technique.
11. Determination of Whiteness and Yellowness index.
12. Determination of K/S of dyed fabrics using Spectrophotometer.
13. Water proof and Flame retardant finishing of cotton
14. Resin and softener finishes.
15. Antimicrobial Finish Evaluation

TOTAL:60 PERIODS

Attested

DIRECTOR
Centre For Academic Courses
Anna University, Chennai-600 025.

OUTCOME:
Upon completing this practical course, the student would be able to

- Desize, scour, bleach, dye, print and finish the fabric with different types of chemicals and colourants
- Evaluate the fabrics for fastness and chemical process related properties

AT7511 GARMENT CONSTRUCTION LABORATORY L T P C
0 0 4 2

OBJECTIVES
To train the students on construction of different types of garments

LIST OF EXPERIMENTS
1. Formation of Stitch classes.
2. Sewing practice of seam types – superimposed seam, lapped seam, bound seam and flat seam.
3. Sewing of plackets
4. Sewing of pockets
5. Sewing of different types of sleeves
6. Sewing of different types of collars
7. Assembling of various garment components using appropriate seams
8. Practice in Button hole and button stitch machines
9. Practice in Feed-off the arm machine
10. Practice in Flat lock machine

TOTAL: 60 PERIODS

OUTCOME:
Upon completion of this practical course, the students can

- Carry out different types of stitching, button holing and button stitching and would have hands on experience on different machines used for garment manufacture
- Understand drafting and draping

AT7651 INDUSTRIAL ENGINEERING IN APPAREL INDUSTRY L T P C
3 0 0 3

OBJECTIVES:
To enable the students to learn about

- Basics of industrial engineering
- Different tools of industrial engineering and its application in apparel industry

UNIT I **5**
Industrial Engineering - evolution, functions, role of industrial engineer; work study- introduction, procedure

UNIT II **13**
Methods study – introduction, approach to method study; techniques of recording; method analysis techniques; principles of motion economy; method study in garment manufacture

UNIT III **9**
Ergonomics - importance, division; ergonomic principles - designing of workplace, working processes, handling material, tools and environment; ergonomic conditions related to garment industry

UNIT IV **13**
Work measurement– introduction; time study – equipment and procedure; standard data; work sampling techniques; incentive wage system; work measurement applied to garment industry; calculation of standard allowance minutes (SAM)

UNIT V **5**

Site selection for garment industry; plant layout - types of layouts suitable for garment industry, methods to construct layout; line balancing

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of this course, the students will be able to apply the following methodologies in garment industry

- Method study, work measurement
- Estimation of SAM
- Layout study and line balancing
- Ergonomics applied to garment industry

REFERENCES

1. George Kanwaty., "Introduction to Work Study ", ILO, Geneva, 1996, ISBN: 9221071081 | ISBN-13: 9789221071082
2. Enrick N. L., "Time study manual for Textile industry", Wiley Eastern (P) Ltd., 1989, ISBN: 0898740444 | ISBN-13: 9780898740448
3. Khanna O. P., and Sarup A., "Industrial Engineering and Management", Dhanpat Rai Publications, New Delhi, 2010, ISBN: 818992835X / ISBN: 978-8189928353
4. Norberd Lloyd Enrick., "Industrial Engineering Manual for Textile Industry", Wiley Eastern (P) Ltd., New Delhi, 1988, ISBN: 0882756311 | ISBN-13: 9780882756318
5. Chuter A. J., "Introduction to Clothing Production Management", Whiley-Black well Science, U.S. A., 1995, ISBN: 0632039396 | ISBN-13: 9780632039395
6. David M. Levine., Timothy C. Krehbiel., and Mark L. Berenson., "Business Statistics: A First Course", 7th Edition, Pearson Education Asia, New Delhi, 2015, ISBN: 032197901X | ISBN-13: 9780321979018
7. Chase., Aquilano., and Jacobs., "Production and Operations Management", Tata McGraw- Hill, New Delhi, 8th Edition, 1999, ISBN: 0256225567 | ISBN-13: 9780256225563
8. Gavriel Salvendy., "Industrial Engineering – Technology and operations management", Wiley-Interscience Publications, USA, 2001, ISBN: 0471330574 | ISBN-13: 9780471330578
9. Gordana Colovic., "Ergonomics in the garment industry", Wood publishing India Pvt. Ltd., India, 2014, ISBN: 0857098225 | ISBN-13: 9780857098221

TT7651 FABRIC QUALITY EVALUATION **L T P C**
3 0 0 3

OBJECTIVES:

To enable the students to learn about the constructional details of fabrics, evaluation of fabric properties and their importance

UNIT I CONSTRUCTION CHARECTERISTICS **9**

Basic fabric particulars – Measurement of ends and picks per inch, count of warp and weft, determination of the type of weave, measurement of length, width, thickness and density (GSM); warp and weft crimp measurements for spun and filament yarn fabrics, the cover factor calculations; fabric sampling techniques.

UNIT II STRENGTH CHARACTERISTICS **9**

Tensile strength measurement – ravelled strip test and grab test, mechanical and electronic measuring systems; tear strength – importance, measuring systems; bursting strength and its measurement; ballistic impact strength; Universal tensile tester - principle and operation

UNIT III SURFACE CHARACTERISTICS 9

Fabric stiffness – principle of measurement of flexural rigidity; drapeability – measurement of drape coefficient; crease recovery - measurement techniques; wrinkle recovery assessment using standard grades; principle and functioning of air permeability testers; water repellency, contact angle and fabric shrinkage testing; fabric abrasion resistance – measuring technique; fabric pilling resistance – methods of determination

UNIT IV LOW STRESS AND FUNCTIONAL CHARACTERISTICS 5

Fabric bending hysteresis testing; shear hysteresis measurements; fabric compression and decompression behaviour; fabric surface roughness and friction measurements; fabric tensile hysteresis measurements; fabric flame resistance testing methods; moisture and thermal characteristics

UNIT V FABRIC INSPECTION AND GARMENT QUALITY 13

Fabric inspection – manual, semi-automatic and automatic inspection systems; classification of fabric defects; independent product quality certification, acceptable quality level, MIL standards and final inspection; quality assessment of garments - cutting, sewing, pressing, finishing and packaging defects.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of this course, students would be able to

- Evaluate the constructional parameters of fabrics
- Understand the principle of equipments used for measurement of fabric characteristics
- Analyze various reports generated during quality evaluation of fabrics
- Understand the evaluation of garment quality

REFERENCES

1. Booth J.E., “Principle of Textile Testing”, Butterworth Publications, London, 1996, ISBN: 8123905157 | ISBN-13: 9788123905150.
2. Seville B.P., “Physical Testing of Textiles”, Textile Institute, Manchester, 1999, ISBN: 1855733676 | ISBN-13: 9781855733671.
3. Kothari V.K., “Testing and Quality Management”, Progress in Textile Technology”, Vol.1, IAFL Publications, New Delhi, 1999.
4. Ruth E. Glock., and Grace I. Kunz., “Apparel Manufacturing – Sewn Product Analysis” 4th Edition, Upper Sadle River Publications, New York, 2004.ISBN: 0131119826 | ISBN-13: 9780131119826
5. Pradip V. Mehta., “Managing Quality in the Apparel Industry”, NIFT Publication, India, 1998.
6. Sara J. Kadolph., “Quality Assurance for Textiles and Apparels”, Fair Child Publications, New York, 1998, ISBN: 8122411665 | ISBN-13: 9788122411669
7. Slater K., “Physical Testing and Quality Control”, The Textile Institute, Vol.23, No.1/2/3 Manchester, 1993, ISBN: 187081245X | ISBN-13: 9781870812450

TT7652 FINANCIAL MANAGEMENT FOR TEXTILE AND APPAREL INDUSTRIES

L T P C
3 0 0 3

OBJECTIVES:

To enable the students to understand

- Basics of financial management that are required for the textile industry
- Determination of cost of yarn, fabric and garment

UNIT I 18

Costing - concepts; classification of costs; preparation of cost sheet; costing of yarn, fabric and garment; cost profit volume analysis, breakeven analysis

UNIT II **9**

Depreciation – method of computing depreciation; techniques of investment analysis - payback period method, accounting rate of return, Discounted Cash Flow methods - IRR, NPV, PI

UNIT III **5**

Capital structure; Sources and cost of capital; working capital management

UNIT IV **13**

Tools for financial analysis and control- profit and loss account, balance sheet; financial ratio analysis - illustrations from textile unit

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students shall be able to

- Determine the cost of yarn, fabrics and garments
- Construct cost sheet
- Understand the economic feasibility of capital investment, sources of capital and cost of capital
- Interpret the financial statements

REFERENCES

1. Pandey I. M., "Financial Management", Vikas Publishing House Pvt. Ltd., New Delhi, 10thEdition, 2010, ISBN: 8125937145 / ISBN: 9788125937142.
2. Bhave P.V., and Srinivasan V., "Costing Accounting to Textile Mills", ATIRA, Ahmadabad, 1976
3. Thukaram Rao M.E., "Cost and Management Accounting" New Age International, Bangalore, 2004, ISBN: 812241513X / ISBN: 978-8122415131.
4. Thukaram Rao M.E., "Cost Accounting and Financial Management" New Age International, Bangalore, 2004, ISBN: 8122415148/ ISBN: 978-8122415148.
5. Prasanna Chandra., "Financial Management - Theory and Practice", 8th Edition, Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2011, ISBN :0071078401 / ISBN: 0071078401.
6. James C. Vanhorne., "Financial Management and Policy", Pearson Education Asia (Low Priced Edition) 12th Edition, 2002, ISBN: 0130326577 | ISBN-13: 9780130326577.
7. Narang, G. B. S., and Kumar V., "Production and Costing", Khanna Publishers, New Delhi, 1988, ISBN: 8174092897 | ISBN-13: 9788174092892
8. Aswat Damodaran., "Corporate Finance Theory and Practice", John Wiley & Sons, 2001, ISBN: 0471283320 | ISBN-13: 9780471283324.
9. Hrishikes Bhattacharya., "Working Capital Management, Strategies and Techniques", Prentice – Hall of India Pvt. Ltd., New Delhi, 2014, ISBN: 8120349040 | ISBN-13: 9788120349049.
10. Khan and Jain, "Basic Financial Management and Practice", Tata McGraw Hill, New Delhi, 7th Edition, 2014, ISBN: 933921305X / ISBN: 978-9339213053.

HS7551 **EMPLOYABILITY SKILLS** **L T P C**
3 0 0 3

COURSE DESCRIPTION

This course aims to help the students acquire the employability skills necessary for the workplace situations. It also attempts to meet the expectations of the employers by giving special attention to language skills, presentation skills, group discussion skills and soft skills. This will be achieved through expert guidance and teaching activities focusing on employability skills.

COURSE OBJECTIVES

- To enhance the employability skills of students with a special focus on presentation skills, group discussion skills and interview skills
- To help them improve their reading skills, writing skills, and soft skills necessary for the

workplace situations
- To make them employable graduates

CONTENTS

UNIT I READING AND WRITING SKILLS 9

Reading: skimming & scanning strategies – note making skills – interpreting visual material (charts & tables) – critical reading – fast reading necessary for reading letters & files - preparing job applications - writing covering letter and résumé - applying for jobs online - email etiquette – writing official letters (placing an order, letters to consumers, etc.) writing reports – collecting, analyzing and interpreting data

UNIT II SOFT SKILLS 9

Hard skills & soft skills – soft skills: self-management skills & people skills - training in soft skills - persuasive skills – sociability skills –interpersonal skills – team building skills – leadership skills – problem solving skills – adaptability - stress management – motivation techniques – life skills -

UNIT III PRESENTATION SKILLS 9

Preparing slides with animation related to the topic – organizing the material - Introducing oneself to the audience – introducing the topic – answering questions – individual presentation practice— presenting the visuals effectively – 5 minute presentation

UNIT IV GROUP DISCUSSION SKILLS 9

Participating in group discussions – understanding group dynamics - brainstorming the topic -– questioning and clarifying –GD strategies (expressing opinions, accepting or refusing others opinions, turn taking) – activities to improve GD skills – viewing recorded GD - mock GD

UNIT V INTERVIEW SKILLS 9

Interview etiquette – dress code – body language – mock interview -–attending job interviews – answering questions confidently – technical interview – telephone/Skype interview - practice in different types of questions – one to one interview &panel interview – FAQs related to job interview- Emotional and cultural intelligence.

LEARNING OUTCOMES

- Students will be able to make presentations and participate in group discussions with high level of self-confidence.
- Students will be able to perform well in the interviews
- They will have adequate reading and writing skills needed for workplace situations

REFERENCES:

1. Corneilssen, Joep. How to Prepare for Group Discussion and Interview. New Delhi: Tata-McGraw-Hill, 2009.
2. Dabreo, Desmond A. Group Discussion and Team Building. Mumbai: Better Yourself Books, 2004.
3. Ramesh, Gopalswamy, and Mahadevan Ramesh. The ACE of Soft Skills. New Delhi: Pearson, 2010.
4. Gulati, Sarvesh. Corporate Soft Skills. New Delhi: Rupa and Co. 2006.
5. Van Emden, Joan, and Lucinda Becker. Presentation Skills for Students. New York: Palgrave Macmillan, 2004.

TOTAL:45PERIODS

EXTENSIVE READING

1. Covey, Stephen R. The 7 Habits of Highly Effective People. New York: Free Press, 2013.
2. Bagchi, Subroto. The Professional. New Delhi: Penguin Books India, 2009.

WEB RESOURCES

1. www.humanresources.about.com
2. www.careerride.com
3. https://bemycareercoach.com/softskills

AT7611 FASHION DESIGN LABORATORY **L T P C**
0 0 2 1

OBJECTIVES:
To practically train the students in fashion drawing and fashion illustration techniques

LIST OF EXPERIMENTS:
1. Experimenting with solids-Men's, women's and children's
2. Experimenting with stripes Men's, women's and children's
3. Experimenting with checks and plaids Men's, women's and children's

TOTAL: 30 PERIODS

OUTCOMES:
Upon completion of this practical course, the students can design men's, women's and children dresses

TT7661 FABRIC QUALITY EVALUATION LABORATORY **L T P C**
0 0 2 1

OBJECTIVE:
To make the students practically learn the various fabric evaluation procedures to determine the characteristics of fabric

LIST OF EXPERIMENTS
Determination of
1. Fabric tensile strength
2. Fabric bursting strength
3. Fabric tear strength
4. Fabric flexural rigidity and bending modulus
5. Drapability of fabrics
6. Fabric crease recovery
7. Fabric wrinkle recovery
8. Fabric abrasion resistance
9. Fabric pilling resistance
10. Fabric air permeability
11. Fabric compression and decompression characteristics
12. Fabric surface roughness and friction coefficient
13. Seam strength and seam slippage

TOTAL:30 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to
- Measure important characteristics of fabrics and garments
- Interpret the results obtained during evaluation of fabrics

AT7702 APPAREL PRODUCTION PLANNING AND PROCESS CONTROL **L T P C**
3 0 0 3

OBJECTIVES:
- To enable the students to understand the production planning in garment industry
- To emphasis on the improved methods of material control in apparel production
- To acquaint student with quality concepts for implementing quality in apparel production

UNIT I **9**
Control parameters and basic data of styles and generalised garment types, new program analysis, style-wise design-wise analysis on production parameters, product development and duplication; concepts of concurrent engineering, reverse engineering, production planning and

time and action calendar, steps between prototypes to approved sample-production sample, product data management and understanding specification sheets and effective communication

UNIT II **9**

Operation break down and production sequence, identification of bottle necks and critical operations, operation wise machinery allocation, usage of special attachments and tools for operation simplifications, production grid and flow chart.

UNIT III **9**

Cutting methods cutting room controls, lay lot planning, bundle distributions, modern methods in cut piece distribution and tracking different manufacturing systems

UNIT IV **9**

Production planning - line balancing, allocation of man power, production set up planning for a shirt factory, production set up planning for a bottoms and jacket factory, production set up planning for a fully integrated apparel manufacturing plant, conveyor system and control parameters

UNIT V **9**

Quality control in pre production and production; packing - ratio packing, solid packing, short shipment, excess shipment, calculation of volumetric weight, carton and other packing requirements; cconcept of AQL

TOTAL: 45 PERIODS

OUTCOME:

Upon completion of this course, the students will understand

- Production planning in garment industry
- Process and quality control in garment industry

REFERENCES

1. Jacob Solinger., "Apparel Production Handbook", Reinhold Publications, 1998, ISBN: 1879570009 / ISBN: 978-1879570009
2. Carr H and Latham B., "The Technology of Clothing Manufacturing", Blackwell Science, U.K.,1994, ISBN: 0632037482 | ISBN-13: 9780632037483
3. Ruth E. Glock., and Grace I. Kunz., "Apparel Manufacturing, Sewn Product Analysis", Fourth Edition, Pearson Education, 2004, ISBN: 0131119826 ISBN-13: 9780131119826.
4. Laing R.M., and Webster J., "Stitches & Seams", The Textile Institute, India, 1999, ISBN: 1870812735 | ISBN-13: 9781870812733
5. Shaeffer Claire., "Sewing for the Apparel Industry", Prentice Hall, New Jersey, 2001, ISBN: 0321062841 | ISBN-13: 9780321062840
6. Singer., "Sewing Lingerie", Cy DeCosse Incorporated, 1991, ISBN: 0865732604 | ISBN-13: 9780865732605
7. Patty Brown., and Janett Rice., "Ready-To-Wear Apparel Analysis", Third Edition, Prentice-Hall Inc., New Jersey,2000, ISBN: 0130254347 | ISBN-13: 9780130254344
8. Chuter A.J., "Introduction to Clothing Production Management", Blackwell Scientific Publications, Oxford, 2001, ISBN: 0632039396 | ISBN-13: 9780632039395

AT7751 APPAREL MARKETING AND MERCHANDISING **L T P C**
3 0 0 3

OBJECTIVES:

To acquaint the students of the concepts of business, design merchandising, sourcing and export documentation

UNIT I INTRODUCTION TO APPAREL BUSINESS **5**

Apparel business practices; business operations in Asian countries. Business practices of Indian apparel export and retail houses.

UNIT II MARKETING FOR APPAREL AND TEXTILE PRODUCTS 13

Marketing for the 21st century, core concepts and orientation towards market place, strategies and planning, market research and forecast, customers, consumer markets and business markets, market segments and brand building, brand positioning and competition

UNIT III DESIGN MERCHANDISING 9

Concepts of merchandising, apparel product lines, dimensions of product change, determination and development of product line and product range. Creative design of garments and accessories, new product development and seasons of sale, costing, coordination and communication with the production house and export house

UNIT IV SOURCING 9

Understanding the basics of sourcing, sourcing strategy and best sourcing practice in apparel and textile businesses, supply chain and demand chain understanding, sourcing negotiations, global co-ordination in sourcing, materials management and quality in sourcing, quick response and supplier partnership in sourcing, JIT technology.

UNIT V EXPORT DOCUMENTATION AND POLICIES 9

Government policies, guide lines for apparel export and domestic trade, tax structures and government incentives in apparel trade. Export documents and its purposes, banking activities, Letter of credit, logistics and shipping, foreign exchange regulation, export risk management and insurance. Export finance, Special economic zones.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of this course, the student shall be able to

- Apply the concept of marketing and merchandizing in the apparel industry in India
- Understand the procedure involved in the export of apparel

REFERENCES

1. Elian stone, Jean A samples, “Fashion Merchandising”, McGraw Hill Book Company, New York, 1985, ISBN: 0-07-061742-2
2. Shivaramu S.,” Export Marketing” – A Practical Guide to Exporters”, Wheeler Publishing, Ohio, 1996, ISBN: 81-7544-166-6
3. Ruth E. Glock, Grace I. Kunz ” Apparel Manufacturing Sewn Product Analysis” Fourth Edition, Pearson Prentice Hall, NJ, 2005, ISBN: 81-7758-076-0

AT7703 RETAIL MANAGEMENT AND VISUAL MERCHANDISING L T P C

3 0 0 3

OBJECTIVES:

- To introduce the students, the fashion business segments, retail management concepts
- To acquaint the students with fashion communication tools

UNIT I 9

Retailing, current global and Indian retail scenario in garment and fashion, key drivers of Indian apparel retail business, growth of organised apparel retail in India; understanding the Indian retail economics, foreign direct investment in Indian apparel retail.

UNIT II 9

Operational excellence, customer service strategies, pricing strategies, inventory levels and merchandise availability as a strategy, case studies on Indian and International retail stores, retail business formats, retail management information system

UNIT III 9

Objectives of store planning, location, design, retail image mix, layout plan for retail stores. Buying, mark-up and mark-down in merchandise management, private labels; apparel franchising- types, Key success factors

UNIT IV **9**

Visual merchandising as a communication tool, presentations in visual merchandising, visual merchandising and enhanced customer buying decision, interiors with respect to brand, sensory elements, signs and graphics, focal point for season and type of sale; case studies on visual merchandising

UNIT V **9**

An introduction to fashion e-commerce, apparel and fashion e-business, s-commerce vs. e-business, economic forces – advantages – myths – e-business models, design, develop and management of e-business, web and social networking, mobile commerce - business applications, classifications, and models, payments, security and legal requirements

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the student shall know

- The concept of retail management
- The concept of visual merchandizing
- e-commerce, s-commerce

REFERENCES

1. Gibson G. Vedamani., "Retail Management Functional Principles & Practices, Third Edition" Jaico Publishing House, 2003, ISBN -10:81-7992-151-4
2. Martin.M. Pegler., "Visual Merchandising and Display", (fifth edition), Fair Child Publications, 2011, ISBN 10: 1563674459
3. Harvey M.Deitel., Paul J.Deitel., and Kate Steinbuhler., "e-business and e-commerce for managers", Pearson, 2011, ISBN: 0130323640 | ISBN-13: 9780130323644
4. Efraim Turban., Jae K. Lee., David King., Ting Peng Liang., and Deborrah Turban., "Electronic Commerce –A managerial perspective", Pearson Education Asia, 2012, ISBN : 0139752854 / ISBN: 978-0139752858

AT7701 **APPAREL COSTING** **L T P C**
2 0 0 2

OBJECTIVES:

To enable the students to learn about preparation of cost sheet, costing of garments

UNIT I **9**

Cost accounting, elements of cost, classification of cost elements – examples from apparel industry, methods of costing; cost profit volume analysis, standard costing, analysis of variance; breakeven analysis

UNIT II **12**

Costing of fabrics; costing of apparel – accounting of prime costs and overhead costs, allocation of overheads; tax structure; cost sheet preparation

UNIT III **3**

Foreign exchange rates; foreign exchange management – risks, strategies to reduce risk

UNIT IV **6**

Budget, types of budgets, budgeting and control in apparel industry

TOTAL: 30 PERIODS

OUTCOMES:

Upon completion of this course, the student shall be able to

- Calculate the cost garment
- Understand the concept of preparation of cost sheet, budget and breakeven analysis

REFERENCES

1. Pandey I. M., "Financial Management",10th Edition, Vikas Publishing House Pvt. Ltd., New Delhi, 2010, ISBN: 8125937145 / ISBN: 978-8125937142

2. Prasanna Chandra., "Financial Management, Theory and Practice",8th Edition, Tata McGraw-Hill Publishing Company Ltd, New Delhi,2011, ISBN: 0071078401 / ISBN: 978-0071078405
3. Aswat Damodaran., "Corporate Finance Theory and Practice", John Wiley & Sons, 2001, ISBN: 0471283320 | ISBN-13: 9780471283324
4. James C., Van Home., "Financial Management and Policy", 12th Edition Prentice Hall of India Pvt. Ltd., New Delhi, 2001, ISBN: 0130326577 | ISBN-13: 9780130326577
5. Thukaram Rao M.E., "Cost and Management Accounting" New Age International, Bangalore, 2004, ISBN:; 812241513X / ISBN: 978-8122415131
6. Khan., and Jain, "Basic financial Management & Practice", 7th Edition, Tata McGraw Hill, New Delhi, 2014, ISBN: 933921305X / ISBN: 978-9339213053

AT7711 COMPUTER AIDED GARMENT DESIGN LABORATORY L T P C
0 0 4 2

OBJECTIVES:
To train the students in CAD used for pattern making of garments and marker planning

LIST OF EXPERIMENTS
Using CAD software to develop
1. Basic Blocks for Men's and Women (top and bottom)
2. Pattern for Men's Formal shirt
3. Pattern for Men's formal trouser (pleats and Flange)
4. Pattern for Women's Tops (application of Dart manipulation principle)
5. Pattern for Women's Bottoms (skirts, pants – Added fullness techniques Gatherings and pleats)
6. Patterns for children's dresses (principles of contouring applied)
7. Patterns for Dungaree and work wear
8. Patterns for Close fitting body shapes
9. Graded patterns
10. Marker and optimise Using digitizer, carryout
11. Reverse pattern Engineering

TOTAL: 60 PERIODS

OUTCOME:
Upon completion of the course, the student will have practical experience on pattern making of different wears, maker planning and optimization

AT7001 APPAREL ACCESSORIES AND EMBELLISHMENTS L T P C
3 0 0 3

OBJECTIVES:
To enable the students to understand different types of apparel accessories used in the garment manufacture and embroidery of garments

UNIT I **13**
Garment components and trims – labels and motifs, linings, interlining wadding, lace, braid and elastic, seam binding and tape, shoulder pads, eyelets and laces, zip fasteners, buttons – tack buttons, snap fastener and rivets; buckles, frag closures, belts, ribbons, fringe, emblems and sequins, decorative and functional trimmings; performance properties of components and trims.

UNIT II **5**
Hook and loop fastening (Velcro), Zippers – anatomy of zipper, types, function of zipper, position of slider, standards on zipper, selection of zipper, application of zipper, shortening of zipper; evaluation of quality of accessories

UNIT III **13**

Embroideries - basic embroidery stitches – chain stitch, button hole stitch, herringbone stitch, feather stitch, lazy daisy, double knot stitch, interlacing stitch, stem stitch, French knot stitch, types of embroidery machines, limitations of hand embroidery; Indian and tribal embroideries - Kutch, Kasuti; Kantha, Kasida, Kathiawar, Phulkari, Sind; Chickankari; Zardosi embroidery; World embroideries

UNIT IV **9**

Fashion accessories – footwear, handbags, gloves, hats, scarves, hosiery, jewellery, watches; elastic waist band, fusible interlinings; safety issues for different accessories in children garment

UNIT V **5**

Batik, Iket, Kalamkari, tie and dye, patch work, appliqué work, bead work

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of this course, the students shall understand

- Different types of accessories used for garment manufacture
- Embroideries
- Fashion accessories
- Different types of printing

REFERENCES

1. Shailaja D. Naik., “Traditional Embroideries of India”, API Publishing Corporation, New Delhi, 1996, ISBN: 8170247314 | ISBN-13: 9788170247319
2. Shella Paine., “Embroidered Textiles”, Thames and Hudson Ltd., U. S. A., 2010, ISBN: 0500288585 | ISBN-13: 9780500288580

AT7071 PRODUCTION AND APPLICATION OF SEWING THREADS **L T P C**
3 0 0 3

OBJECTIVES:

To enable the students to understand the requirements and production of sewing threads for different applications

UNIT I **13**

Sewing threads – property requirements for different applications; ticket numbering; characterization of sewing threads; sewability of the thread, seam efficiency index

UNIT II **14**

Types of sewing thread – spun threads, core spun threads, filament threads; production, properties and applications; fancy yarns – types and production; metallic yarns

UNIT III **13**

Characteristics and application of high performance sewing threads - aramid threads, ceramic threads, polypropylene threads, polyethylene threads, polytetrafluroethylene threads, fibreglass threads, other sewing threads – tencel, acrylic, linen, elastic, soluble; embroidery threads

UNIT IV **5**

Sewing defects related to sewing threads – Assessment and control

TOTAL: 45 PERIODS

OUTCOMES:

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

- Production of sewing thread
- Characterization of sewing thread and
- Selection of sewing thread for different end uses.

REFERENCES

1. Ukponmwan J.O., Mukhopadhyay A., and Chatterjee K.N., “Sewing threads”, Textile Progress, 2000, ISBN: 1870372387 | ISBN-13: 9781870372381.
2. Carl A Lawrence., “Fundamentals of Spun Yarn Technology”, CRC Press, Florida, USA, 2003, ISBN: 1566768217 | ISBN-13: 9781566768214
3. Carr H., “The Technology of Clothing Manufacture”, Blackwell Publisher, UK, 2004, ISBN: 0632021934 | ISBN-13: 9780632021932
4. Ruth E. Glock., “Apparel Manufacturing Sewn Product Analysis”, Prentice Hall, New Jersey, 2005,ISBN: 0131119826 | ISBN-13: 9780131119826
5. Jacob Solinger., “Apparel Production Handbook”, Reinhold Publications, 1998, ISBN: 1879570009 / ISBN: 978-1879570009
6. Rao J.V., and Rajendra Kr.Gaur., “Sewing Threads: Technology, Stitches, Seams, Problems, Needles”, NITRA, 2006.
7. Gong R.H., and Wright R.M., “Fancy yarns –Their manufacture and application”, Woodhead Publishing Ltd, England, 2002, ISBN: 0849315506 | ISBN-13: 9780849315503.

AT7072 PROTECTIVE TEXTILES L T P C
3 0 0 3

OBJECTIVES:

To enable the students understand the selection of fibre, yarn, fabric and design of garments for different protective applications

UNIT I FIBRES, YARNS AND FABRICS FOR PROTECTIVE GARMENTS 13

Characteristic requirements of fibre, yarn and fabric for flame proof, heat resistant, ballistic resistance, electrical conduction, bacterial protection, radiation protection and radiation contamination protection

UNIT II CHEMICAL FINISHES FOR PROTECTIVE FABRICS 5

Mechanism, Chemistry, Materials and methods - Flame retardant, Liquid repellent, Antistatic, Antibacterial, UV protection and mite protection finishes

UNIT III PROTECTIVE FABRICS IN DIFFERENT APPLICATIONS 9

Protective fabrics used in the medical field and in hygiene; military combat clothing; protective fabrics against biological and chemical warfare; textiles for high visibility; antigravity suit

UNIT IV PROTECTIVE GARMENT CONSTRUCTION 9

Garment construction - method of construction of garments according to various protective end uses; use of accessories for protective garment; ergonomics of protective clothing

UNIT V EVALUATION OF PROTECTIVE TEXTILES 9

Standards and test method for protective fabric performance - flame retardant finishes, liquid repellent finishes, antistatic, liquid repellent, antibacterial, UV protection, mite protection; manikins-thermal manikins, segmented thermal manikins; evaporative resistance measurement-moisture permeability index, skin model; concept of dynamic manikins; permeation resistance test-index of penetration and index of repellency; liquid tight integrity and gas tight integrity

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students shall

- Select fibres, yarns and fabrics for different protective applications
- Construct protective garments
- Evaluate protective textiles

REFERENCES

1. Adanur S., “Wellington Sears Handbook of Industrial Textiles”, Technomic Publishing Co. Inc., 1995, ISBN : 1 – 56676 – 340 – 1.

2. Pushpa Bajaj., and Sengupta A.K., “Protective Clothing”, The Textile Institute, 1992, ISBN:1-870812 – 44-1.
3. Chellamani K. P., and Chattopadhyay D., “Yarns and Technical Textiles”, SITRA, 1999.
4. Scott R.A., “Textiles for Protection”, Wood head Publishing Limited, Cambridge, UK, ISBN :1-85573-921-6, 2005.
5. Saville.B.P., “Physical Testing of Textiles”, Wood head Publishing Limited, Cambridge, UK, ISBN :1-85573-367-6, 1999.
6. Fan Q., “Chemical Testing of Textiles”, Wood head Publishing Limited, Cambridge, UK, ISBN :1-85573-917-8, 2005.
7. Long A.C., “Design and Manufacture of Textile Composites”, Wood head Publishing Limited, Cambridge, UK, ISBN : 1-85573-744-2, 2005.
8. Fung W., “Coated and Laminated Textiles”, Wood head Publishing Limited, Cambridge, UK, ISBN :1-85573-576-8, 2002.
9. Horrocks A.R. and Anand S.C., “Handbook of Technical Textiles”, Wood head Publishing Limited, Cambridge, UK, ISBN :1-85573-385-4, 2004.
10. Anand S.C., Kennedy J.F., Miraftab M., and Rajendran S., “Medical Textiles and Biomaterials for Health Care”, Wood head Publishing Limited, Cambridge, UK, ISBN:1-85573-683-7, 2006

TT7073 OPERATIONS RESEARCH FOR TEXTILE INDUSTRY L T P C
3 0 0 3

OBJECTIVES:

To enable the students to learn about

- Various operations research (OR) methods that can be applied in the textile industry
- Expressing of problems arising in the textile industry in appropriate Operations Research formats
- Methods of solving such Operations Research problems

UNIT I **9**

Introduction – History of Operations Research, Scope of Operation Research, applications and limitations; The linear programming problem – construction, solution by graphical method, the Simplex method and its extension by the Big M method; Sensitivity analysis; Application of the LP technique in the field of Textile technology.

UNIT II **9**

The Transportation problem – construction, initial basic feasible solution – North West Corner rule, lowest cost entry method, Vogel’s Approximation Method; the optimality test - MODI method, stepping stone method; replacement analysis

UNIT III **9**

The Assignment problem – construction, solution by Hungarian method, application in the textile industry; sequencing problems; integer programming – construction, solving by cutting plane method

UNIT IV **9**

Decisions theory - decisions under assumed certainty, decision under risk, decision under uncertainty, illustrations from textile industry; simulation-theory, models, queuing system; inventory control - EOQ models-deterministic models –probabilistic models;

UNIT V **9**

Project planning and control models: CPM, PERT – network representation, determining critical path, project duration; crashing of project duration; resource levelling

TOTAL: 45 PERIODS

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OUTCOMES:

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

- Design Operations Research problems from the cases arising in the Textile Industry,
- Solve the above Operations Research problems by providing optimized solutions for them

REFERENCES

1. Frederick S. Hillier., Gerald J. Lieberman., Frederick Hillier., and Gerald Lieberman., "Introduction to Operations Research", McGraw-Hill International Edition, 8th Edition, 2004, ISBN: 0073017795 / ISBN: 978-0073017792
2. Hamdy A Taha., "Operations Research – An Introduction", Prentice Hall, 9thEdition, 2010, ISBN: 013255593X | ISBN-13: 9780132555937.
3. Fabrycky W. J.,Ghare P. M., and Torgersen P. E., "Applied Operation Research and Management Science", Prentice Hall, New Jersey, 1984, ISBN: 013041459X / ISBN: 9780130414595.
4. Panneerselvam R., "Operations Research", Prentice-Hall of India Pvt. Ltd; 2nd Edition, 2004, ISBN : 8120319230 / ISBN: 978-8120329287
5. Tulsian P.C., "Quantitative Techniques Theory and Problems", Dorling Kindersley (India) Pvt. Ltd., 2006, ISBN: 8131701867 | ISBN-13: 9788131701867
6. Ronald L. and Rardin., "Optimization in Operations Research", Pearson Education, 1998, ISBN: 0023984155 | ISBN-13: 9780023984150
7. Srivastava U.K., Shenoy G.V., and Sharma S. C., "Quantitative Techniques for Managerial Decisions", Second Edition, New Age International (P) Ltd., 2007, ISBN: 0470273755 | ISBN-13: 9780470273753
8. Gupta P. K., and Hira D.S., "Problems in Operations Research",3rd Edition S. Chand & Company, 2013, ISBN: 8121909686 ISBN-13: 9788121909686
9. Mustafi C.K., "Operations Research: Methods and Practice", 5thEdition, New Age International (P) Ltd., 2012, ISBN: 8122433421 | ISBN-13: 9788122433425
10. Sharma J. K., "Operations Research: Theory and Applications", 5th Edition, Laxmi Publication, New Delhi, 2013, ISBN: 935059336X / ISBN: 9789350593363

TT7076 TOTAL QUALITY MANAGEMENT FOR TEXTILE INDUSTRY L T P C
3 0 0 3

OBJECTIVES:

- To enable the students to understand about total quality management, different TQM tools and techniques and Quality standards
- To train the students to apply TQM tools in textile industry

UNIT I INTRODUCTION 9

Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of product and service quality - Basic concepts of TQM – TQM Framework - Contributions of Quality Gurus – Barriers to TQM – Cost of Quality.

UNIT II TQM PRINCIPLES 9

Quality statements - Customer focus –Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Continuous process improvement – PDCA cycle, 5S, Kaizen- Supplier partnership – Partnering, Supplier selection, Supplier Rating.

UNIT III TQM TOOLS & TECHNIQUES I 13

The seven traditional tools of quality – New management tools – Six-sigma: Concepts, methodology, applications to spinning, weaving, chemical processing and garment industries– Bench marking – Reason to bench mark, Bench marking process – FMEA – Stages, Types; Quality circles – Quality Function Deployment (QFD) – Taguchi quality loss function – TPM –

Concepts, improvement needs – Performance measures – BPR; application of TQM tools in textile industry

UNIT IV LEAN MANUFACTURING, QUALITY SYSTEMS 14

Need for ISO 9000-ISO 9000-2000 Quality System – Elements, Documentation, Quality auditing; OHSAS 18000, ISO 14000 – Concepts, Requirements and Benefits - Quality Council – Leadership, Employee involvement – Motivation, Empowerment, Team and Teamwork, Recognition and Reward; Lean manufacturing – overview, principle, fundamental lean tools; Waste – definition, types; waste management in apparel industry- identification and control; inventory control; Kanban flow; flexible manufacturing concept

TOTAL: 45 PERIODS

OUTCOMES:

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

- Understand the principle of TQM, different TQM tools and techniques
- Develop innovative tools to implement TQM in the textile industry
- Understand lean manufacturing system applied to textile industry

REFERENCES

1. Dale H.Besterfiled., “Total Quality Management”, Pearson Education Asia, Third Edition, Indian Reprint, 2006, ISBN: 0130306517 | ISBN-13: 9780130306517
2. James R.Evans., and William M. Lindsay., “The Management and Control of Quality”, (6thEdition), South-Western (Thomson Learning), 2005, ISBN: 0324202237 | ISBN-13: 9780324202236
3. Oakland J.S., “TQM – Text with Cases”, Butterworth – Heinemann Ltd., Oxford, Third Edition, 2003, ISBN: 0750657405 | ISBN-13: 9780750657402
4. SuganthiL., and Anand Samuel., “Total Quality Management”, Prentice Hall (India) Pvt.Ltd.2006, ISBN: 8120326555 / ISBN: 978-8120326552.
5. Janakiraman B., and Gopal R.K., “Total Quality Management–Text and Cases”,Prentice Hall (India) Pvt. Ltd., 2006, ISBN: 8120329953 | ISBN-13: 9788120329959
6. Ronald G. Askin and Jeffrey B. Goldberg, “Design and Analysis of Lean Production Systems”, John Wiley & Sons, 2003
7. Bruce A. Henderson and Jorge L. Larco, “Lean Transformation”, The Oaklea Press, 1999
8. Don Topping, Tom Luyster, and Tom Shuker, “Value Stream Management”, Productivity Press, 2002

TT7071 CLOTHING COMFORT L T P C
3 0 0 3

OBJECTIVES:

To enable the students to learn about the

- Important characteristics of the fabric responsible for its comfort properties and
- Different phenomena which take place in the fabric related to the comfort properties of the fabric

UNIT I 9

Comfort – types and definition; human clothing system, comfort perception and preferences

UNIT II 9

Psychological comfort; neuro-physiological comfort-basis of sensory perceptions; measurement techniques - mechanical stimuli and thermal stimuli

UNIT III 9

Thermo physiological comfort – thermoregulatory mechanisms of the human body, role of clothing on thermal regulations

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UNIT IV **9**

Heat and moisture transfer – moisture exchange, wearer's temperature regulations, effect of physical properties of fibres, behaviour of different types of fabrics

UNIT V **9**

Fabric tactile and mechanical properties - fabric prickliness, itchiness, stiffness, softness, smoothness, roughness, and scratchiness; predictability of clothing comfort performance

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of this course, the student shall be able to

- Understand different phenomena such as perception of comfort, fabric mechanical properties and, heat and moisture interaction and
- Correlate the property of the fabric with comfort to the wearer

REFERENCES

1. Hassan M. Behery., "Effect of Mechanical and Physical Properties on Fabric Hand", Wood head Publishing Ltd.,2005, ISBN: 1855739186 | ISBN-13: 9781855739185
2. Li Y., "The Science of Clothing Comfort", Textile Progress 31:1-2, Taylor and Francis, UK, 2001, ISBN: 1870372247 | ISBN-13: 9781870372244
3. Laing R.M., and Sleivert G.G., "Clothing, Textile and Human Performance" Textile Progress 32:2, The Textile Institute, 2002, ISBN: 1870372514 | ISBN-13: 9781870372510.
4. Apurba Das.,and Alagirusamy R., "Science in clothing comfort", Wood head Publishing India Pvt. Ltd., India, 2010, ISBN: 1845697898 | ISBN-13: 9781845697891
5. Guowen Song., "Improving comfort in clothing", Wood head Publishing Ltd., UK, 2011, ISBN: 1845695399 | ISBN-13: 9781845695392
6. Ukponmwan J.O., "The Thermal-insulation Properties of Fabrics", Textile Progress 24:4, 1-54, Taylor and Francis, UK, 1993, ISBN: 1870812654 | ISBN-13: 9781870812658

AT7002 **BRAND MANAGEMENT** **L T P C**
3 0 0 3

OBJECTIVE:

To introduce students the concept of brand, brand building, branding strategies and legal issues in brand management

UNIT I **9**

Product – definition, types; product line, product mix; new product development; estimating market and sales potential, sales forecasting

UNIT II **13**

Brand – definition, evolution, importance; product vs. brand; terminologies used in branding; branding –creation, challenges, understanding consumer, competition, components; brand identity - brand naming, logos, characters, slogans, tools to maintain identity, illustrations from apparel industry

UNIT III **9**

Brand Building: brand insistence model; advertising – definition, objectives, modes, economic and ethics; non-traditional marketing approach

UNIT IV **9**

Branding strategies; brand extension, brand revitalization, brand repositioning, brand recall, brand elimination, brand imitation

UNIT V **5**

Brand equity measurement systems; legal issues in brand management; global branding

TOTAL: 45 PERIODS

OUTCOME:

On completion of this course, the students would have the knowledge on consumer behavior, brand identity and brand equity management

REFERENCES

1. Brad Van Auken, “Branding”, Jaico Publishing House, Mumbai, India, 2010, ISBN: 81-7992-668-0
2. Mahim Sagar, Deepali Singh, Agrawal D.P., Achintya Gupta, “Brand Management”, Ane Books India Pvt. Ltd., India, 2009, ISBN: 8180522830
3. Harsh V. Verma, “ Brand Management”, Excel Books, New Delhi, India, 2004

AT7004 HOME TEXTILES L T P C
3 0 0 3

OBJECTIVES

To enable the students to learn about the

- Recent developments in home furnishing, floor covering and other home textile products
- Various kinds of materials used as home textiles

UNIT I INTRODUCTION 5

Home textiles market scenario, Consumer expectation from home textiles, Fibers and fabrics used.

UNIT II HOME FURNISHING 13

Furnishings Materials – Woven, non- woven and knits; Manufacturing concepts- damask, brocade, organdie, chiffon, oxford, tapestry. Living room furnishings – types, fabric selection and design concepts ;Bed room furnishings- types, fabric selection and design concepts; Advances in the production of - Different Types of Bed Linen – Sheets – Blankets – Blanket Covers – Comforts – Comfort Covers – Bed Spreads – Mattress and Mattress Covers – Pads–Pillows; Kitchen furnishing -Fabric selection – dish cloth, hand towels, aprons, mittens and runners.

UNIT III FLOOR COVERING AND DRAPES 13

Recent Developments in manufacturing of floor coverings - Hard Floor Coverings, Resilient Floor Coverings; Soft Floor Coverings- laying procedure, maintenance and care, Carpets and Rugs- types; Cushion and Pads; factors affecting the selection of floor covering; Advances in Home decoration -Draperies – choice of fabrics – curtains – finishing of Draperies- tucks and pleats; Types of drapery rods, Hooks, Tape Rings and Pins

UNIT IV FINISHES USED IN HOME TEXTILES 9

Introduction, thermal draperies, protection against unpleasant odour, antimicrobial finish, moisture management finish, flame retardant finish, towel finishing, Sensory perception technology; insect and mite repellent finish, antistatic finish; temperature regulated beddings

UNIT V EVALUATION OF HOME TEXTILES 5

Test methods - towels, rugs; other test methods for home textiles, flammability standards for curtains, test methods for pot holders and woven mittens; labelling of home textiles

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of this course, the student shall be able to understand

- Different types of materials used as home textiles
- Production and evaluation of home textile products

REFERENCES

1. Alexander.N.G., “Designing Interior Environment”, Mas Court Brace Covanorich, Newyork, 1972

2. Donserkery.K.G., “Interior Decoration in India”, D.B.Taraporeval Sons and Co. Pvt. Ltd., 1979, ISBN: 0906216338 | ISBN-13: 9780906216330
3. Wingate J. F., and Mohler I. B., “Textile Farbics& Their Selection”, Prentice Hall Inc., New York, 1984,ISBN: 0139128654 | ISBN-13: 9780139128653
4. Subtra Das , “Performance of home textiles”, Woodhead Publishing India Pvt.Ltd, 2010, ISBN: 0857090070 | ISBN-13: 9780857090072
5. Rowe T., “Interior Textiles Design and Developments”, Woodhead Publishing India Pvt.Ltd, 2009, ISBN: 1845693515 | ISBN-13: 9781845693510
6. Schindler W. D., and Hauser P. J., “Chemical finishing of textiles”, Woodhead Publishing, England, 2004, ISBN: 1855739054 | ISBN-13: 9781855739055

AT7005 INTIMATE APPARELS L T P C
3 0 0 3

OBJECTIVES:
To acquaint students on the design, material, accessories and sewing aspects of intimate garments

UNIT I **5**
Intimate apparels –classification, materials-fibre, fabric and accessories; physical and physiological requirements of intimate apparels

UNIT II **9**
Design analysis, measurements, pattern drafting of men’s intimate apparel – Long johns, tank top, boy shorts, knickers, bikini underwear, thong, boxer briefs, boxer shorts and jock strap.

UNIT III **13**
Design analysis, measurements, pattern drafting of women’s intimate apparel – petticoats, panties, camisoles, tube top, shape wear, bikini and brassier.

UNIT IV **5**
Intimate apparel accessories - Bra wire, hook and eye tape, ring and slider, buckle, plastic bone, elastics and sewing threads

UNIT V **13**
Sewing of intimate apparels - seams, stitches, machines; lamination; moulding and welding technique

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of this course, the students will have the skills essential to design and develop intimate apparels

REFERENCES
1. Yu W., Fan J., Harlock S.C., and Ng S. P., “Innovations and Technology of Women’s Intimate Apparel”, Wood head Publishing Limited, England 2006, ISBN: 0849391059 | ISBN-13: 9780849391057
2. Ann Haggar., “Pattern Cutting for Lingerie, Beachwear and Leisurewear”, Black Well Science Limited, France, 2004, ISBN: 140511858X / ISBN: 978-1405118583

TT7012 QUALITY EVALUATION OF FIBRES AND YARNS L T P C
3 0 0 3

OBJECTIVES:
To make the students understand the principle and method of working of equipments used for testing of fibres and yarns

UNIT I INTRODUCTION 5

Definition of quality; importance of quality assessment; method of developing quality and productivity norms; selection of samples for quality assessment – random and biased samples, squaring technique and zoning technique for fibre selection; yarn sampling - use of random numbers; sampling for various types of yarn tests.

UNIT II FIBRE LENGTH AND STRENGTH ANALYSIS 9

Fibre testing, the fibre quality index and spinnability; fibre length and length uniformity- measuring techniques; tensile strength testing modes – CRT, CRE, CRL and ARL; fibre strength, importance, relation to yarn strength; measurement techniques

UNIT III FIBRE FINENESS, MATURITY AND TRASH ANALYSIS 9

Fibre fineness – definition, comparison of various fibres, its importance in yarn manufacture, measurement techniques; cotton fibre maturity, estimation by microscopic method, maturity ratio and index, estimation by other methods – optical, air flow differential dyeing, its importance in spinning; fibre trash – influence on quality, measurement, principle and estimation microdust for rotor spinning; high volume instrument for total fibre quality measurement

UNIT IV YARN COUNT, TWIST AND STRENGTH 9

Yarn numbering systems-Indirect and direct systems, count conversions; count measuring systems; twist in single and ply yarns, twist directions, twist factor, twist and yarn strength; twist measurement and breaking twist angle measurement; single yarn strength; lea count- strength product (CSP) and Corrected Count Strength Product (CCSP)

UNIT V YARN MASS EVENNESS AND SURFACE QUALITY 9

Yarn mass evenness parameters, measurement; Yarn fault classification; Yarn Appearance; yarn abrasion resistance – importance and measuring technique; yarn hairiness – importance and assessment techniques; yarn friction– static and dynamic friction, methods of measurement

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of this course, the student shall 99be able to

- Understand the principle of equipments used for testing of fibres and yarns
- Apply knowledge gained through this course, while operating the equipments
- Analyze and interpret the results obtained from quality evaluating systems of fibre and yarns

REFERENCS

1. Booth J.E., “Principle of Textile Testing”, Butterworth Publications, London, 1989, ISBN: 0592063259 | ISBN-13: 9780592063256.
2. Seville B.P., “Physical Testing of Textiles”, Textile Institute, Manchester, 1999, ISBN: 1855733676 | ISBN-13: 9781855733671.
3. Kothari V. K., “Progress in Textiles: Science & Technology Vol 1 Testing & Quality Management”, IAFL Publications, New Delhi, 1999, ISBN: 819010330X | ISBN-13: 9788190103305
4. Ruth E.Glock., and Grace I. Kunz., “Apparel Manufacturing – Sewn Product Analysis Fourth Edition”, Pearson/Prentice Hall, 2005, ISBN: 0131119826 / ISBN: 978-0131119826
5. Pradip V. Mehta P.E., and Satish K. Bhardwaj., “Managing Quality in the Apparel Industry”, National Institute of Fashion Technology, India 1998, ISBN: 8122411665 | ISBN-13: 9788122411669
6. Sara J. Kadolph., “Quality Assurance for Textiles and Apparels”, Fair child Publications, New York, 2007, ISBN: 1563675544 | ISBN-13: 9781563675546.
7. Slater K., “Physical Testing and Quality Control”, The Textile Institute, Vol.23, No.1/2/3 Manchester, 1993, ISBN: 187081245X | ISBN-13: 9781870812450.

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AT7073 SMART TEXTILES L T P C
3 0 0 3

OBJECTIVES:
To enable the students understand the concept and construction of smart fabrics, intelligent textiles and interactive garments

UNIT I 13
An overview on smart textiles, electrically active polymers materials- application of non-ionic polymer gel and elastomers for artificial muscles; heat storage and thermo regulated textiles and clothing, thermally sensitive materials, cross – linked polymers of fibre substrates as multifunctional and multi-use intelligent material; mechanical properties of fibre Bragg gratings, optical responses of FBG (Fibre Bragg grating) sensors under deformation ; smart textile composites integrated with optic sensors

UNIT II 9
Adaptive and responsive textile structures, bio-processing for smart textiles and clothing, tailor made intelligent polymers for biomedical application

UNIT III 9
Smart fabrics – passive, active, very smart; classification of smart materials, concept of wearable computing, basic structure of fabric used for integrating different electronic sensors

UNIT IV 14
Smart interactive garments for combat training, hospital and patient care; smart garments in sports and fitness activities; smart garments for children; smart home textiles

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of this course, the students shall have the knowledge on
- Construction of smart textiles
- Wearable electronics and smart interactive garments

REFERENCES

1. Sanjay Gupta., “Smart Textiles their Production and Marketing Strategies”, NIFT, New Delhi, 2000.
2. William C. Smith., “Smart Textile Coating and Laminates”, Wood Head Publishing Series in Textiles, UK, 2010, ISBN 978-1-84569-379-4.
3. Tao X. M., “Smart Fibers, Fabrics and Clothing Fundamentals and Application”, Wood Head Publishing Ltd., October 2001, ISBN 1 855735466.
4. Mc Cann J. and Bryson D., “Smart Clothes and Wearable Technology”, Wood Head Publishing Series in Textiles, UK, 2010, ISBN-10: 1845693574

GE7351 ENGINEERING ETHICS AND HUMAN VALUES L T P C
3 0 0 3

OBJECTIVES
- To emphasise into awareness on Engineering Ethics and Human Values.
- To understand social responsibility of an engineer.
- To appreciate ethical dilemma while discharging duties in professional life.

UNIT I HUMAN VALUES 3
Morals, Values and Ethics – Integrity – Work Ethic – Honesty – Courage –Empathy – Self-Confidence – Discrimination- Character.

UNIT II ENGINEERING ETHICS 9
Senses of ’Engineering Ethics’ - variety of moral issued - types of inquiry - moral dilemmas - moral autonomy - Kohlberg’s theory - Gilligan’s theory - consensus and controversy – Models of Professional Roles - theories about right action - Self-interest –Professional Ideals and Virtues -

uses of ethical theories. Valuing Time – Co-operation – Commitment –

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as experimentation - engineers as responsible experimenters - codes of ethics – Importance of Industrial Standards - a balanced outlook on law – anticorruption- occupational crime -the challenger case study.

UNIT IV ENGINEER'S RIGHTS AND RESPONSIBILITIESON 12

Collegiality and loyalty – Respect for authority – Collective Bargaining – Confidentiality- Conflict of interest – Occupational Crime – Professional Rights – IPR- Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk - the Three Mile Island, Bhopal Gas plant and chernobyl as case studies.

UNIT V GLOBAL ISSUES 12

Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers-consulting engineers-engineers as expert witnesses and advisors -moral leadership-Sample code of conduct.

TOTAL : 45 PERIODS

OUTCOMES

- Students will have the ability to perform with professionalism , understand their rights , legal ,ethical issues and their responsibilities as it pertains to engineering profession with engaging in life-long learning with knowledge of contemporary issues.

TEXT BOOKS

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw-Hill, New York 2005.
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Wadsworth Thompson Leatning, United States, 2000 (Indian
3. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

REFERENCES

1. Charles D. Fleddermann, "Engineering Ethics", Pearson Education / Prentice Hall, New Jersey, 2004
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Wadsworth Thompson Leatning, United States, 2000
3. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003.
4. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford Press , 2000
5. R.Subramanian , "Professional Ethics ",Oxford University Press ,Reprint ,2015.

TT7072 COLOUR SCIENCE L T P C
3 0 0 3

OBJECTIVES:

To enable the students to understand the theory of colour and measurement of colour

UNIT I LIGHT-MATTER INTERACTION 9

Electromagnetic spectrum – the optical region, interaction of light with matter a) Transparent case – Beer's Law and Lambert's Law b) Opaque case – reflection absorption and scattering, the concept of "Radiative Transfer Theory" and its simplification into the Kubelka – Munk model

UNIT II HUMAN COLOUR VISION 9

Colour sensation – physiological and psychological mechanism of colour vision; colour vision theories; defects in colour vision; colour vision tests; additive and subtractive colour mixing, and confusion in colour perception

Attested

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UNIT III COLOUR ORDER SYSTEMS 9

Description of colour, various colour order systems, CIE numerical system for colour definition and its components – illuminants, the versions of the standard observer, the colour scales, chromaticity diagram.

UNIT IV NUMERICAL COLOUR MATCHING 9

Reflectance and K/S value, relationship between dye concentrations and a) reflectance values and b) K/S values, reflectance and K/S curves of dyed samples; CIE model for computer colour matching and the calculation of colour recipes; non CIE models for colour matching, limitations of computer colour matching

UNIT V METAMERISM AND COLOUR DIFFERENCE ASSESSMENT 9

Metamerism – types and its assessment, metamerism in textile materials; colour differences – visual assessment, standard conditions, methods and problems, assessment of colour difference, non-linearity of subjective perception of colour, need for specific colour difference systems, setting up of objective pass/fail standards.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of this course, the students shall be able to

- Understand the theory of colour
- Numerical colour matching

REFERENCES

1. Wright W.D., “The Measurement of Colour”, Adam Hilger Ltd., 1969, ISBN: 0852741340 | ISBN-13: 9780852741344
2. Sule A.D., “Computer Colour Analysis”, New Age International Publishers, 2005, ISBN: 8122410847 | ISBN-13: 9788122410846.
3. Shah H.S., and Gandhi R. S., “Instrumental Colour Measurement and Computer Aided Colour Matching for Textiles”, Mahajan Book Publication, 1990.ISBN: 8185401004 / ISBN: 9788185401003.
4. Park J., “Instrumental Colour Formulation: A Practical Guide”, Wood head Publishing, 1993, ISBN: 0901956546 | ISBN-13: 9780901956545
5. Kuehni R.G., “Computer Colorant Formulation”, Lexington Books, 1976, ISBN: 0669033359 | ISBN-13: 9780669033359
6. ChoudhuryA. K. R., “Modern Concepts of Colour and Appearance”, Oxford and IBH Publishing Ltd., 2000,ISBN: 1578080797 | ISBN-13: 9781578080793
7. McLaren K., “The Colour Science of Dyes & Pigments”, Adam Hilger Ltd., 1983, ISBN: 0852744269 | ISBN-13: 9780852744260.
8. Travis D., “Effective Colour Displays”, Academic Press, 1991,ISBN: 0126976902 | ISBN-13: 9780126976908.
9. Gulrajani M. L. (Ed.), “Colour Measurement - Principles, advances and industrial applications”, Woodhead publishing Ltd, 2010, ISBN: 1845695593 | ISBN-13: 9781845695590

TT7011 HUMAN RESOURCE MANAGEMENT L T P C
3 0 0 3

OBJECTIVES:

To enable the students understand various aspects of human resources management and different acts related to personnel

UNIT I 9

Human resource development systems - The Indian society in transition, understanding the concepts of HRD past, present and future , strategies adopted, structure, objectives and working of the HRD system in India and abroad , role of HR managers in textile and apparel industries.

UNIT II **9**

Human resource planning – objectives of planning on the macro level, demand forecasting of HR planning, MIS in HR planning ,future skill mapping, human resource outsourcing, recruitment and processes involved in textile and apparel industries, induction ; training objectives, methods, carrier planning, performance and potential appraisal.

UNIT III **9**

Job - analysis, description, evaluation, enrichment; Performance measurement- objectives, methods, multi-skill development, motivation. Organised labour, understanding groups, development, cohesion, alienation, group work behaviour & managing international work force.

UNIT IV **9**

Compensation, wage policy, industrial pay-structure, types, components, laws and methods of payment; methods of wage fixation in a textile mill and apparel units; laws governing employee benefits and welfare, incentives, overtime, bonus, cost to the company.

UNIT V **9**

Different Acts governing labour welfare and employment; employee discipline- disciplinary actions, procedures, suspension, dismissal and retrenchment, roll of trade unions, collective bargaining, industrial democracy and workers participation in management, related case studies.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of this course, the students shall be able to understand various human resource management activities in the industry and labour acts

REFERENCES

1. Decenzo., and Robbins., "Human Resource Management", 10th Edition, Wiley, 2010, ISBN: 0470169680 / ISBN: 978-0470169681
2. Dessler., and Gary., "Human Resource Management", Pearson Education Limited, 2007, ISBN: 0134235452 | ISBN-13: 9780134235455
3. Mamoria C.B., "Personnel Management", Himalaya Publishing Company, 2007, ISBN: 8184888082 / ISBN: 978-8184888089
4. Bernadin., "Human Resource Management", 6th Edition, Tata Mcgraw Hill , 2006, ISBN: 0078029163 / ISBN: 978-0078029165
5. Eugence Mckenna., and Nic Beach., "Human Resource Management",2nd Edition, Pearson Education Limited, 2008, ISBN: 0273694189 / ISBN: 978-0273694182
6. Wayne Cascio., "Managing Human Resource",9th Edition, McGraw Hill, 2012, ISBN: 0078029171 ISBN-13: 9780078029172

AT7007 PRODUCTION AND OPERATIONS MANAGEMENT **L T P C**
3 0 0 3

OBJECTIVES:

To impart knowledge on production planning, types of layouts, production concepts and materials management

UNIT I **9**

Factors of production; environmental and social concerns of operations; design of production system; forecasting in production and operation management – various qualitative and quantitative techniques

UNIT II **9**

Capacity planning; facility planning – objectives; different types of layouts, developing process layout, product layout; job design techniques

UNIT III **9**

Aggregate production planning – procedure, importance; scheduling in operation management–

mass production system, batch and job shop

UNIT IV **9**

Material management – material planning, purchase, stores, material handling and disposal; inventory models; MRP-objectives, elements of MRP, MRP computation, implementation

UNIT V **9**

Concepts - Total Productive Maintenance, Just In Time, Total Quality Management; Automated Technology, CIM, CAD, FMS, GT, CAM, CAPP

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of this course, the students shall understand

- Procedure for capacity planning, selection of layouts
- Concept of material management
- Different production concepts

REFERENCES

1. Buffa E.S., and Sarin R.K., "Modern Production / Operations Management", John Wiley & Sons. Inc., 1994, ISBN: 0471819050 | ISBN-13: 9780471819059
2. Taha H.A., "Operations Research: An Introduction",9th Edition, Prentice Hall of India, New Delhi, 2010, ISBN: 013255593X | ISBN-13: 9780132555937
3. Adam E.E., and Elbert R.J., "Production and Operations Management", Prentice Hall of India, New Delhi, 1997, ISBN: 0137249551 / ISBN: 978-0137249558
4. Chary S.N., "Production and Operations Management",3rd Edition, Tata McGraw-Hill, New Delhi, 2006, ISBN: 0070583552 / ISBN: 978-0070583559
5. Narasimhan S.L., Mcleavy, D.W., and Billington P.J., "Production Planning and Inventory Control", Prentice Hall of India, New Delhi, 1997,ISBN: 0131862146 | ISBN-13: 9780131862142
6. Grant Ireson., "Factory Planning & Plant Layout", Prentice Hall, New Jersey, 1952, ISBN: B0007DOZII

TT7074 SUPPLY CHAIN MANAGEMENT FOR TEXTILE INDUSTRY **L T P C**
3 0 0 3

OBJECTIVES:

- To provide an insight on the fundamentals of supply chain networks, tools and techniques.
- To train the students to new and recent developments in supply chains, e-business and information technology

UNIT I **9**

Basic principles of supply chain management and logistics, supply chain models, supply chain for volatile market; supply chain drivers and metrics in apparel industries; roll of supply chain in the textile and apparel industries' financial stability.

UNIT II **9**

Planning supply and demand in apparel production house, managing economies of scale, supply cycle and inventory levels; managing uncertainty in supply chain, safety pricing and inventory; make Vs buy decision, make Vs hire decision; geographical identification of suppliers, supplier evaluation, supplier selection, contract negotiations and finalisation.

UNIT III **9**

Distribution network and design for global textile and apparel products, models of distribution – facility location and allocation of capacity, uncertainty on design and network optimisation; the role of transportation in supply chain, modes of transportation, characteristics of transportation,

transport design options for global textile and apparel network, trade-off in transport design, risk management in transportation, transport decision in practice for textile and apparel industries.

UNIT IV **9**

Coordination in supply chain- the bullwhip effect, forecasting, obstacles to coordination in supply chain; supply chain management for apparel retail stores, high fashion fad; supply chain in e-business and b2b practices

UNIT V **9**

Import - Export management, documentation, insurance, packing and foreign exchange; methods of payments – domestic, international, commercial terms; dispute handling modes and channels; supply chain and Information system; Customer relationship management

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of this course, the student shall have the

- Knowledge of the framework and scope of supply chain networks and functions
- Capacity to develop clear, concise and organized approach to operations management

REFERENCES

1. Janat Shah., "Supply Chain Management – Text and Cases", Pearson Education, 2009, ISBN: 8131715175 | ISBN-13: 9788131715178
2. Peter Meindl., Kalra D. V., Kalra D., and Sunil Chopra" Supply Chain Management-Strategy Planning and Operation", Pearson Education, 2010, ISBN: 8131730719 | ISBN-13: 9788131730713.
3. David Simchi-Levi., Philip Kaminsky., and Edith Simchi-Levi., "Designing and Managing the Supply Chain: Concepts, Strategies, and Cases", 3rd Edition, Tata McGraw-Hill, 2012, ISBN: 0073341525 / ISBN: 978-0073341521
4. Altekar Rahul V., "Supply Chain Management-Concept and Cases", PHI, 2005, ASIN: B00K7YGX2S

TT7075 TEXTILE AND APPAREL EXIM MANAGEMENT **L T P C**
3 0 0 3

OBJECTIVES:

To give the students an exposure on international market for textile products, regulations with respect to export and import of textiles

UNIT I **5**

International markets for yarns, woven fabrics; international market for cotton, silk, jute, wool and other fibres; export and import of textiles by India – current status, promotional activities

UNIT II **5**

International markets for carpets and home textiles – product types, market potential and statistics, India - current status and promotional activities, role of export promotional councils

UNIT III **9**

International markets for woven piece goods, knitted garments, leather garments; statistics of international apparel market and trade; export incentives, role of AEPC, CII, FIEO, Textile Committee

UNIT IV **13**

Marketing – strategies, global brand building; logistics & SCM; role of export finances & EXIM banking, ECGC, Indian council of arbitration, FEMA; impact of foreign trade on Indian economy

UNIT V **13**

Exim policy - customs act, acts relating to export/import of textile and apparel; Indian customs formalities - export documentation for excisable goods, import documentation, clearance of import

goods; concepts - 100% export oriented units, export processing zones, special economic zones; duty drawback procedure; import/export incentives; licenses; case study

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of this course, the student shall have the knowledge on

- International market for textile products
- Global marketing strategies and
- EXIM policy and procedures

REFERENCES

1. Charles W.I. Hill., and Arun Kumar Jain., "International Business", 10th Edition, Tata McGraw Hill, 2014, ISBN: 007811277X / ISBN: 978-0078112775.
2. John D. Daniels., and Lee H. Radebaugh., "International Business", 15th Edition, Pearson Education Asia, New Delhi, 2014, ISBN: 0133457230 / ISBN: 978-0133457230.
3. Aswathappa K., "International Business",6th Edition, Tata McGraw Hill, 2015, ISBN: 933922258X / ISBN: 978-9339222581.
4. Michael R. Czinkota., Ilkka A. Ronkainen., and Michael H.,Moffet, "International Business",8th Edition, Wiley, 2010, ISBN: 0470530650 / ISBN: 978-0470530658
5. Aravind V. Phatak., Rabi S. Bhagat., and Roger J. Kashlak., "International Management", 2nd Edition, Tata McGraw Hill, 2008, ISBN: 0073210579 / ISBN : 978-0073210575
6. OdedShenkar., and YaongLuo., "International Business",3rd Edition, Routledge, 2014, ISBN : 0415817137 / ISBN : 978-0415817134
7. Datey V.S., "Indirect Taxes",34th Edition, Taxmann Publications, 2015, ISBN: 9350715570 / ISBN: 9789350715574.
8. Kapoor D.C., "Export Management", Vikas Publishing House Pvt. Ltd., 2009, ISBN: 8125909397 / ISBN: 978-8125909392
9. Govindan N.S., "Indirect Taxes Made Easy", C. Sitaraman & Co., 2014, ASIN: B00HYVS32K

TT7551 TECHNOLOGY OF BONDED FABRICS L T P C
3 0 0 3

OBJECTIVES:

To enable the students to learn about the

- Fundamentals of bonded fabrics
- Different method of web formation and bonding

UNIT I FUNDAMENTALS OF BONDED FABRICS 5

Definitions and classification of bonded fabrics; fibres, fibre preparations and their characteristics for the production of bonded fabrics, uses; methods of bonded fabric production

UNIT II WEB FORMATION WITH STAPLE FIBRES 9

Production of staple-fibre web by dry and wet methods; influence of web laying methods on fabric properties; quality control of web

UNIT III MECHANICAL, CHEMICAL AND THERMAL BONDING 13

Bonded fabric production by mechanical bonding - needling, stitching, water jet consolidation; thermal Bonding technologies; chemical bonding – binder polymers and bonding technologies

UNIT IV POLYMER – LAID WEB AND FABRIC FORMATION 9

Manufacture of Spun bonded fabrics, fibre orientation in spun bonded fabrics and characterization of filament arrangement; manufacture of melt blown fabrics – fibre formation and its attenuation; effect of processing parameters on fabric characteristics

UNIT V FINISHING AND APPLICATION OF BONDED FABRICS 9

Dry and Wet finishing; characterisation, structure - property relationship in bonded fabrics; End uses of bonded fabrics; safety measures to be taken at the nonwoven industry; process control in the manufacture of bonded fabrics.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course the student will be able to

- Explain different types of nonwovens and their method of production
- Explain different type of finishes applied on the nonwovens and their end uses
- Choose appropriate web preparation and bonding techniques for getting desired properties in fabric.

REFERENCES

1. Lunenschloss J., Albrecht W. and David Sharp., "Nonwoven Bonded Fabrics", Ellis Horwood Ltd., New York, 1985, ISBN: 0-85312-636-4.
2. Mrstina V. and Feigl F., "Needle Punching Textile Technology", Elsevier, New York, 1990, ISBN: 0444988041 | ISBN-13: 9780444988041
3. Dharmadhikary R. K., Gilmore T. F., Davis H. A. and Batra S. K., "Thermal Bonding of Nonwoven Fabrics", Textile Progress, Vol.26, No.2, Textile Institute Manchester, 1995, ISBN: 1870812786.
4. Jirsak O. and Wadsworth L. C., "Nonwoven Textiles", Textile Institute, Manchester, 1999, ISBN: 0 89089 9788.
5. Russell S., "Hand Book of Nonwovens", Textile Institute, Manchester, 2004, ISBN: 185573 6039.
6. Chapman R., "Applications of Nonwovens in Technical Textiles", Textile Institute, Manchester, 2010, ISBN: 1 84569 4376
7. Abhijit Majumdar, Apurba Das, R.Alagirusamy and V.K.Kothari., "Process Control in Textile Manufacturing", Wood Head Publishing Limited, Oxford, 2013, ISBN: 978-0-85709-027-0.

GE7071 DISASTER MANAGEMENT L T P C

3 0 0 3

OBJECTIVES:

- To provide students an exposure to disasters, their significance and types.
- To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction
- To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR)
- To enhance awareness of institutional processes in the country and
- To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity

UNIT I INTRODUCTION TO DISASTERS 9

Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don'ts during various types of Disasters.

UNIT II APPROACHES TO DISASTER RISK REDUCTION (DRR) 9

Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake-holders- Institutional Processess and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.

UNIT III INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT 9

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT IV DISASTER RISK MANAGEMENT IN INDIA 9

Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT V DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS 9

Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

TOTAL: 45 PERIODS

OUTCOMES:

The students will be able to

- Differentiate the types of disasters, causes and their impact on environment and society
- Assess vulnerability and various methods of risk reduction measures as well as mitigation.
- Draw the hazard and vulnerability profile of India, Scenarious in the Indian context,
- Disaster damage assessment and management.

TEXTBOOKS:

1. Singhal J.P. “Disaster Management”, Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13: 978-9380386423
2. Tushar Bhattacharya, “Disaster Science and Management”, McGraw Hill India Education Pvt. Ltd., 2012. **ISBN-10:** 1259007367, **ISBN-13:** 978-1259007361]
3. Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011
4. Kapur Anu Vulnerable India: A Geographical Study of Disasters, IIAS and Sage Publishers, New Delhi, 2010.

REFERENCES

1. Govt. of India: Disaster Management Act , Government of India, New Delhi, 2005
2. Government of India, National Disaster Management Policy,2009.

GE7074 HUMAN RIGHTS L T P C
3 0 0 3

OBJECTIVES :

- To sensitize the Engineering students to various aspects of Human Rights.

UNIT I 9

Human Rights – Meaning, origin and Development. Notion and classification of Rights – Natural, Moral and Legal Rights. Civil and Political Rights, Economic, Social and Cultural Rights; collective / Solidarity Rights.

UNIT II 9

Evolution of the concept of Human Rights Magana carta – Geneva convention of 1864. Universal Declaration of Human Rights, 1948. Theories of Human Rights.

UNIT III **9**

Theories and perspectives of UN Laws – UN Agencies to monitor and compliance.

UNIT IV **9**

Human Rights in India – Constitutional Provisions / Guarantees.

UNIT V **9**

Human Rights of Disadvantaged People – Women, Children, Displaced persons and Disabled persons, including Aged and HIV Infected People. Implementation of Human Rights – National and State Human Rights Commission – Judiciary – Role of NGO's, Media, Educational Institutions, Social Movements.

TOTAL : 45 PERIODS

OUTCOME :

- Engineering students will acquire the basic knowledge of human rights.

REFERENCES:

1. Kapoor S.K., "Human Rights under International law and Indian Laws", Central Law Agency, Allahabad, 2014.
2. Chandra U., "Human Rights", Allahabad Law Agency, Allahabad, 2014.
3. Upendra Baxi, The Future of Human Rights, Oxford University Press, New Delhi.

AT7006 KNIT WEAR DEVELOPMENT **L T P C**
3 0 0 3

OBJECTIVES:

To enable the students to learn about design and production of different garments

UNIT I INTRODUCTION **9**

Introduction to knitted materials types and features; grain, support and shape trims, linings and interlinings; requirements for sewing knitted fabrics; compression garments

UNIT II CHILDRENS WEAR **9**

Construction of Children's wear - stitches, seams, sewing and special machine selection and assembly operations; Rompers, Creeper, Jumpsuit, legging and skirts

UNIT III WOMENS WEAR **9**

Women's wear construction- stitches, seams, sewing and special machine selection and assembly operations – Tunic, Tank Tops, Sports top's, Capri, Legging

UNIT IV MENS WEAR **9**

Construction and assembly of men's wear - stitches, seams, sewing and special machine selection and assembly operations; T-Shirts, Polo Shirts, Raglon, Kimono Tee's, Cap's, Active wear, Sweat shirts, Hooded and non-hooded jackets

UNIT V INTIMATE APPARELS **9**

Construction of Intimate apparels of men's and women's- assembly of men's wear - stitches, seams, sewing and special machine selection and assembly operations; Vests, Briefs, women's Hipster, panties, bikini, thong, brassier and trunks

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of this course, the students shall be able to select the fabric and design the garment for children, women and men.

REFERENCES

1. Harrold Carr., and Barbara Latham., "Technology of Clothing Manufacture", Blackwell Scientific Publications, UK, 2000, ISBN: 0632037482 | ISBN-13: 9780632037483

2. Ruth E. Glock., and Grace I Kunz., “Apparel Manufacturing Sewn Product Analysis”,4th Edition, Prentice Hall, New Jersey,2004, ISBN: 0131119826 | ISBN-13: 9780131119826
3. Lynn Nottage., “Intimate Apparel / Fabulation”, Theatre Communications Group, USA, 2006, ISBN: 1559362790 | ISBN-13: 9781559362795
4. Stokes Terry., “Intimate Apparel”, Brooklyn: Release Press, USA, 1980, ISBN: 0913722197 | ISBN-13: 9780913722190
5. Singer., “Sewing Lingerie”, CyDecosse Incorporated, Mexico, 1991,ISBN: 0865732604 | ISBN-13: 9780865732605
6. Ann Haggar., “Pattern Cutting for Lingerie, Beachwear and Leisurewear”, Black Well Science Limited, France, 2004, ISBN: 140511858X | ISBN-13: 9781405118583

AT7003 DENIM MANUFACTURING L T P C
3 0 0 3

OBJECTIVES:

To enable the students to learn about

- Requirement of fibre, yarn
- Production of fabric, dyeing and finishing
- Stitching for denim garments

UNIT I **5**

An overview on denim and jeans; fiber qualities for denim yarn production; yarns for denim production and their characteristics

UNIT II **9**

Indigo dye and its reduction; dyeing technology of denim yarns; non-indigo dyes for denims; weaving and finishing of denim fabrics.

UNIT III **13**

Denim garment manufacture -types of garments and production sequence, seams and stitches, sewing threads and needles, sewing machines, fastenings, trims, pressing and Inspection.

UNIT IV **9**

Dry and wet finishes to produce effects and colours on denim garments; novel denims

UNIT V **9**

Dyeing of denim garments; digital printing of denim garments; comfort aspects of denim

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of this course, the students shall know about

- Fibres and yarns used for production of denim garments
- Weaving and chemical processing of denim fabrics
- Stitching and finishing of denim garments

REFERENCES:

1. Parmar M. S., Satsangi S. S., and Jai Prakash, “Denim – A fabric for ALL (Dyeing, Weaving, Finishing)”, NITRA, Ghaziabad, India, 1996.
2. Roshan Paul (Ed.), “Denim – Manufacture, Finishing and Applications”, Woodhead Publishing, 2015, ISBN: 0857098438 | ISBN-13: 9780857098436

GE7072	FOUNDATION SKILLS IN INTEGRATED PRODUCT DEVELOPMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the global trends and development methodologies of various types of products and services
- To conceptualize, prototype and develop product management plan for a new product based on the type of the new product and development methodology integrating the hardware, software, controls, electronics and mechanical systems
- To understand requirement engineering and know how to collect, analyze and arrive at requirements for new product development and convert them in to design specification
- To understand system modeling for system, sub-system and their interfaces and arrive at the optimum system specification and characteristics
- To develop documentation, test specifications and coordinate with various teams to validate and sustain up to the EoL (End of Life) support activities for engineering customer

UNIT I FUNDAMENTALS OF PRODUCT DEVELOPMENT 9

Global Trends Analysis and Product decision - Social Trends - Technical Trends- Economical Trends - Environmental Trends - Political/Policy Trends **- Introduction to Product Development Methodologies and Management -** Overview of Products and Services - Types of Product Development - Overview of Product Development methodologies **-** Product Life Cycle – Product Development Planning and Management.

UNIT II REQUIREMENTS AND SYSTEM DESIGN 9

Requirement Engineering - Types of Requirements - Requirement Engineering - traceability Matrix and Analysis - Requirement Management - **System Design & Modeling -** Introduction to System Modeling - System Optimization - System Specification - Sub-System Design - Interface Design.

UNIT III DESIGN AND TESTING 9

Conceptualization - Industrial Design and User Interface Design - Introduction to Concept generation Techniques – **Challenges in Integration of Engineering Disciplines** - Concept Screening & Evaluation - **Detailed Design -** Component Design and Verification – **Mechanical, Electronics and Software Subsystems** - High Level Design/Low Level Design of S/W Program **-** Types of Prototypes, S/W Testing- Hardware Schematic, Component design, Layout and Hardware Testing – **Prototyping -** Introduction to Rapid Prototyping and Rapid Manufacturing - **System Integration, Testing, Certification and Documentation**

UNIT IV SUSTENANCE ENGINEERING AND END-OF-LIFE (EOL) SUPPORT 9

Introduction to Product verification processes and stages - Introduction to Product Validation processes and stages - Product Testing Standards and Certification - Product Documentation - **Sustenance -**Maintenance and Repair – Enhancements - **Product EoL -** Obsolescence Management – Configuration Management - EoL Disposal

UNIT V BUSINESS DYNAMICS – ENGINEERING SERVICES INDUSTRY 9

The Industry - Engineering Services Industry - Product Development in Industry versus Academia –**The IPD Essentials -** Introduction to Vertical Specific Product Development processes -Manufacturing/Purchase and Assembly of Systems - Integration of Mechanical, Embedded and Software Systems – Product Development Trade-offs - Intellectual Property Rights and Confidentiality – Security and Configuration Management.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Define, formulate and analyze a problem
- Solve specific problems independently or as part of a team
- Gain knowledge of the Innovation & Product Development process in the Business Context
- Work independently as well as in teams
- Manage a project from start to finish

TEXTBOOKS:

1. Book specially prepared by NASSCOM as per the MoU.
2. Karl T Ulrich and Stephen D Eppinger, "Product Design and Development", Tata McGraw Hill, Fifth Edition, 2011.
3. John W Newstorm and Keith Davis, "Organizational Behavior", Tata McGraw Hill, Eleventh Edition, 2005.

REFERENCES:

1. Hiriyappa B, “Corporate Strategy – Managing the Business”, Author House, 2013.
2. Peter F Drucker, “People and Performance”, Butterworth – Heinemann [Elsevier], Oxford, 2004.
3. Vinod Kumar Garg and Venkita Krishnan N K, “Enterprise Resource Planning – Concepts”, Second Edition, Prentice Hall, 2003.
4. Mark S Sanders and Ernest J McCormick, "Human Factors in Engineering and Design", McGraw Hill Education, Seventh Edition, 2013

AT7008	**ERP FOR APPAREL INDUSTRY**	**L T P C**
		1 0 4 3

UNIT I **9+36**

Enterprise Resource Planning – principle, frame work, scope; application of ERP in garment industry - business concepts, costing, order booking, MRP, purchase, production planning, production orders, inventory control, packing, shipping, scheduling, sample preparation and approval, business reports

UNIT II **3+12**

ERP in apparel production – time study, cutting, production tracking, cut panel process, garment quality control, order completion, machine repairs and maintenance, reports

UNIT III **3+12**

ERP in retail management – style template, finished goods barcoding, stock taking, stock inward, retail order booking, stock allocation, scan and pack, dispatch, invoice, point of sale, reports

Total number of periods (Theory + Lab):15+60

TEXT BOOKS:

1. VeenaBansal, “Enterprise resource planning”, Pearson Education India, 2013
2. Sadagopan. S., “ERP-A Managerial Perspective”, Tata McGraw-Hill Education Pvt. Ltd., New Delhi, 2001
3. Garg and Venkitakrishnan, Venkitakrishnan N.K. “ERPWARE, ERP Implementation Framework”, Prentice Hall of India Pvt. Ltd., New Delhi, 2004

REFERENCES:

1. Vinod Kumar Grag and Venkitakrishnan N.K., “Enterprise Resource Planning: Concepts and practice”, Prentice Hall of India Pvt. Ltd, New Delhi, 2011
2. Joseph.A.Brady, Ellen F. Monk, Bret J. Wagner, “Concepts in Enterprise Resource Planning”, Course Technology, 2001