

**ANNA UNIVERSITY, CHENNAI**  
**AFFILIATED INSTITUTIONS**  
**R-2013**  
**B.TECH. FASHION TECHNOLOGY**

**PROGRAMME OBJECTIVES:**

- Prepare the students to demonstrate technical competence in their profession by applying knowledge of basic and contemporary science, engineering and experimentation skills for identifying manufacturing problems and providing practical and innovative solutions.
- Prepare the students to understand the professional and ethical responsibilities in the local and global context and hence utilize their knowledge and skills for the benefit of the society.
- Enable the students to work successfully in a manufacturing environment and function well as a team member and also exhibit continuous improvement in their understanding of their technical specialization through self learning and the skill to apply it to further research and development.
- Enable the students to have sound education in selected subjects essential to develop their ability to initiate and conduct independent investigations.
- Impart fundamental knowledge in the field of textile and Fashion technology
- Provide a broad abstract and academic viewpoint of apparel manufacturing that will serve as a basis for future apparel professionals
- Enable the students to bridge the gap between graduate studies and practical work operations for the design and subsequent profitable operation of apparel industry

**PROGRAMME OUTCOMES:**

The students will be able to

- Apply knowledge of mathematics, science and engineering in Apparel design and production processes
- Design and conduct experiments, as well as to analyze and interpret data
- Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- Function on multidisciplinary teams
- Identify, formulate, and solve engineering problems related to apparel production processes
- Understand the professional and ethical responsibility
- Prepare technical documents and present effectively
- Use the techniques, skills, and modern engineering tools necessary for practicing in the apparel design manufacturing industry.
- Build high moral character
- Practise better methods in apparel production and planning to take informed business decisions in the apparel industry

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**R - 2013**

**B. TECH. FASHION TECHNOLOGY**

**I – VIII SEMESTERS CURRICULUM AND SYLLABUS**

**SEMESTER - I**

CODE	COURSE TITLE	L	T	P	C
<b>THEORY</b>					
HS6151	Technical English – I	3	1	0	4
MA6151	Mathematics – I	3	1	0	4
PH6151	Engineering Physics – I	3	0	0	3
CY6151	Engineering Chemistry – I	3	0	0	3
GE6151	Computer Programming	3	0	0	3
GE6152	Engineering Graphics	2	0	3	4
<b>PRACTICAL</b>					
GE6161	Computer Practices Laboratory	0	0	3	2
GE6162	Engineering Practices Laboratory	0	0	3	2
GE6163	Physics and Chemistry Laboratory - I	0	0	2	1
<b>TOTAL</b>		<b>17</b>	<b>2</b>	<b>11</b>	<b>26</b>

**SEMESTER – II**

CODE	COURSE TITLE	L	T	P	C
<b>THEORY</b>					
HS6251	Technical English - II	3	1	0	4
MA6251	Mathematics - II	3	1	0	4
PH6251	Engineering Physics - II	3	0	0	3
CY6251	Engineering Chemistry - II	3	0	0	3
GE6252	Basic Electrical and Electronics Engineering	4	0	0	4
GE6253	Engineering Mechanics	3	1	0	4
<b>PRACTICAL</b>					
GE6261	Computer Aided Drafting and Modeling Laboratory	0	1	2	2
GE6262	Physics and Chemistry Laboratory - II	0	0	2	1
GE6263	Computer Programming Laboratory	0	1	2	2
<b>TOTAL</b>		<b>19</b>	<b>5</b>	<b>6</b>	<b>27</b>

**SEMESTER – III**

CODE	COURSE TITLE	L	T	P	C
<b>THEORY</b>					
MA6468	Probability and Statistics	3	1	0	4
FT6301	Textile Fibres	3	0	0	3
TC6302	Technology of Yarn Manufacture	3	1	0	4
GE6351	Environmental Science and Engineering	3	0	0	3
FT6302	Garment Construction	3	0	0	3
FT6303	Fashion Evolution	3	0	0	3
<b>PRACTICALS</b>					
FT6311	Fashion Illustration Laboratory	0	0	3	2
FT6312	Fibre Science Laboratory	0	0	3	2
GE6562	Employability Skills	0	0	2	1
<b>TOTAL</b>		<b>20</b>	<b>1</b>	<b>8</b>	<b>26</b>

### SEMESTER – IV

CODE	COURSE TITLE	L	T	P	C
<b>THEORY</b>					
FT6401	Pattern Engineering I	3	0	0	3
FT6402	Fashion accessories and costumes	3	0	0	3
FT6403	Garment Production Machinery and Equipments	3	0	0	3
TT6402	Fabric Structure	3	0	0	3
FT6404	Textile Chemical Processing I	3	0	0	3
TC6405	Technology of Fabric Manufacture	3	1	0	4
<b>PRACTICALS</b>					
TT6461	Fabric structure laboratory	0	0	3	2
FT6411	Pattern Engineering Laboratory - I	0	0	3	2
FT6412	Garment Construction Laboratory I	0	0	3	2
<b>TOTAL</b>		<b>18</b>	<b>1</b>	<b>9</b>	<b>25</b>

### SEMESTER – V

CODE	COURSE TITLE	L	T	P	C
<b>THEORY</b>					
FT6501	Textile Chemical Processing – II	3	0	0	3
FT6502	Textile and Apparel Quality Evaluation	3	0	0	3
TT6503	Knitting Technology	3	0	0	3
FT6503	Garment Finishing and Clothing Care	3	0	0	3
FT6504	Apparel Production Planning and Control	3	0	0	3
FT6505	Pattern Engineering – II	3	0	0	3
<b>PRACTICALS</b>					
FT6511	Pattern Engineering Laboratory - II	0	0	3	2
FT6512	Textile Chemical Processing Laboratory	0	0	3	2
FT6513	Textile and Garment Testing Laboratory	0	0	3	2
<b>TOTAL</b>		<b>18</b>	<b>0</b>	<b>9</b>	<b>24</b>

### SEMESTER – VI

CODE	COURSE TITLE	L	T	P	C
<b>THEORY</b>					
FT6601	Clothing Science	3	0	0	3
FT6602	Speciality Fabrics and Technology	3	0	0	3
FT6603	Fashion Forecasting	3	0	0	3
FT6604	Apparel Costing	3	0	0	3
FT6605	Industrial Engineering in Apparel Industry	3	0	0	3
FT6606	Apparel Marketing and Merchandising	3	0	0	3
<b>PRACTICALS</b>					
FT6611	Garment CAD Laboratory	0	0	3	2
FT6612	Garment Construction Laboratory II	0	0	3	2
FT6613	Mini Project and Design Collection	0	0	3	2
<b>TOTAL</b>		<b>18</b>	<b>0</b>	<b>9</b>	<b>24</b>

### SEMESTER – VII

CODE	COURSE TITLE	L	T	P	C
<b>THEORY</b>					
FT6701	Visual Merchandising	3	0	0	3
GE6757	Total Quality Management	3	0	0	3
MG6089	Supply Chain Management	3	0	0	3
FT6702	Home Textiles	3	0	0	3
	Elective – I	3	0	0	3
	Elective – II	3	0	0	3
<b>PRACTICALS</b>					
FT6711	Apparel Engineering and Product Development Laboratory	0	0	2	1
GE6773	Presentation Skills and Technical Seminar	0	0	2	1
	<b>TOTAL</b>	<b>18</b>	<b>0</b>	<b>5</b>	<b>20</b>

### SEMESTER – VIII

CODE NO.	COURSE TITLE	L	T	P	C
<b>THEORY</b>					
	Elective – III	3	0	0	3
	Elective – IV	3	0	0	3
<b>PRACTICALS</b>					
FT6811	Project Work	0	0	12	6
	<b>TOTAL</b>	<b>6</b>	<b>0</b>	<b>12</b>	<b>12</b>

**TOTAL NO OF CREDITS : 183**

### LIST OF ELECTIVES

#### B.TECH. FASHION TECHNOLOGY

#### ELECTIVE I

CODE NO.	COURSE TITLE	L	T	P	C
FT6001	Fashion Photography	3	0	0	3
FT6002	Intimate Apparels	3	0	0	3
FT6003	Garment Trims and Accessories	3	0	0	3

#### ELECTIVE II

CODE NO.	COURSE TITLE	L	T	P	C
FT6004	Functional Apparels and Clothing	3	0	0	3
FT6005	Protective Clothing	3	0	0	3
FT6006	Apparel Size and Fit analysis	3	0	0	3

**ELECTIVE – III**

<b>CODE NO.</b>	<b>COURSE TITLE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
FT6007	Leather Garment Technology	3	0	0	3
FT6008	Sewing Threads and Fancy Yarns	3	0	0	3
FT6009	Colour Science	3	0	0	3

**ELECTIVE – IV**

<b>CODE NO.</b>	<b>COURSE TITLE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
GE6075	Professional Ethics in Engineering	3	0	0	3
FT6010	Brand Management	3	0	0	3
FT6011	Apparel Entrepreneurship	3	0	0	3

**OBJECTIVES:**

- To enable learners of Engineering and Technology develop their basic communication skills in English.
- To emphasize specially the development of speaking skills amongst learners of Engineering and Technology.
- To ensure that learners use the electronic media such as internet and supplement the learning materials used in the classroom.
- To inculcate the habit of reading and writing leading to effective and efficient communication.

**UNIT I****9+3**

Listening - Introducing learners to GIE - Types of listening - Listening to audio (verbal & sounds); Speaking - Speaking about one's place, important festivals etc. – Introducing oneself, one's family / friend; Reading - Skimming a reading passage – Scanning for specific information - Note-making; Writing - Free writing on any given topic (My favourite place / Hobbies / School life, etc.) - Sentence completion - Autobiographical writing (writing about one's leisure time activities, hometown, etc.); Grammar - Prepositions - Reference words - Wh-questions - Tenses (Simple); Vocabulary - Word formation - Word expansion (root words / etymology); E-materials - Interactive exercises for Grammar & Vocabulary - Reading comprehension exercises - Listening to audio files and answering questions.

**UNIT II****9+3**

Listening - Listening and responding to video lectures / talks; Speaking - Describing a simple process (filling a form, etc.) - Asking and answering questions - Telephone skills – Telephone etiquette; Reading – Critical reading - Finding key information in a given text - Sifting facts from opinions; Writing - Biographical writing (place, people) - Process descriptions (general/specific) - Definitions - Recommendations – Instructions; Grammar - Use of imperatives - Subject-verb agreement; Vocabulary - Compound words - Word Association (connotation); E-materials - Interactive exercises for Grammar and Vocabulary - Listening exercises with sample telephone conversations / lectures – Picture-based activities.

**UNIT III****9+3**

Listening - Listening to specific task - focused audio tracks; Speaking - Role-play – Simulation - Group interaction - Speaking in formal situations (teachers, officials, foreigners); Reading - Reading and interpreting visual material; Writing - Jumbled sentences - Coherence and cohesion in writing - Channel conversion (flowchart into process) - Types of paragraph (cause and effect / compare and contrast / narrative / analytical) - Informal writing (letter/e-mail/blogs) - Paraphrasing; Grammar - Tenses (Past) - Use of sequence words - Adjectives; Vocabulary - Different forms and uses of words, Cause and effect words; E-materials - Interactive exercises for Grammar and Vocabulary - Excerpts from films related to the theme and follow up exercises - Pictures of flow charts and tables for interpretations.

**UNIT IV****9+3**

Listening - Watching videos / documentaries and responding to questions based on them; Speaking - Responding to questions - Different forms of interviews - Speaking at different types of interviews; Reading - Making inference from the reading passage - Predicting the content of a reading passage; Writing - Interpreting visual materials (line graphs, pie charts etc.) - Essay writing – Different types of essays; Grammar - Adverbs – Tenses – future time reference; Vocabulary - Single word substitutes - Use of abbreviations and acronyms; E-materials - Interactive exercises for Grammar and Vocabulary - Sample interviews - film scenes - dialogue writing.

**UNIT V****9+3**

Listening - Listening to different accents, Listening to Speeches/Presentations, Listening to broadcast and telecast from Radio and TV; Speaking - Giving impromptu talks, Making presentations on given topics; Reading - Email communication - Reading the attachment files having a poem/joke/proverb - Sending their responses through email; Writing - Creative writing, Poster making; Grammar - Direct and indirect speech; Vocabulary - Lexical items (fixed / semi fixed expressions); E-materials - Interactive exercises for Grammar and Vocabulary - Sending emails with attachment – Audio / video excerpts of different accents - Interpreting posters.

**OUTCOMES:**

Learners should be able to

- speak clearly, confidently, comprehensibly, and communicate with one or many listeners using appropriate communicative strategies.
- write cohesively and coherently and flawlessly avoiding grammatical errors, using a wide vocabulary range, organizing their ideas logically on a topic.
- read different genres of texts adopting various reading strategies.
- listen/view and comprehend different spoken discourses/excerpts in different accents

**TEXTBOOKS:**

1. Department of English, Anna University. Mindscapes: English for Technologists and Engineers. Orient Blackswan, Chennai. 2012
2. Dhanavel, S.P. English and Communication Skills for Students of Science and Engineering. Orient Blackswan, Chennai. 2011

**REFERENCES:**

1. Raman, Meenakshi & Sangeetha Sharma. Technical Communication: Principles and Practice. Oxford University Press, New Delhi. 2011.
2. Regional Institute of English. English for Engineers. Cambridge University Press, New Delhi. 2006.
3. Rizvi, Ashraf. M. Effective Technical Communication. Tata McGraw-Hill, New Delhi. 2005
4. Rutherford, Andrea. J Basic Communication Skills for Technology. Pearson, New Delhi. 2001.
5. Viswamohan, Aysha. English for Technical Communication. Tata McGraw-Hill, New Delhi. 2008.

**EXTENSIVE Reading (Not for Examination)**

1. Kalam, Abdul. Wings of Fire. Universities Press, Hyderabad. 1999.

**WEBSITES:**

1. <http://www.usingenglish.com>
2. <http://www.uefap.com>

**TEACHING METHODS:**

- Lectures
- Activities conducted individually, in pairs and in groups like self introduction, peer introduction, group poster making, grammar and vocabulary games, etc.
- Discussions
- Role play activities
- Short presentations
- Listening and viewing activities with follow up activities like discussion, filling up worksheets, writing exercises (using language lab wherever necessary/possible) etc.

**EVALUATION PATTERN:**

**Internal assessment: 20%**

3 tests of which two are pen and paper tests and the other is a combination of different modes of assessment like

- Project
- Assignment
- Reviews
- Creative writing
- Poster making, etc.

All the four skills are to be tested with equal weightage given to each.

- ✓ Speaking assessment: Individual speaking activities, Pair work activities like role play, Interview, Group discussions

- ✓ Reading assessment: Reading passages with comprehension questions graded from simple to complex, from direct to inferential
- ✓ Writing assessment: Writing paragraphs, essays etc. Writing should include grammar and vocabulary.
- ✓ Listening/Viewing assessment: Lectures, dialogues, film clippings with questions on verbal as well as audio/visual content.

**End Semester Examination: 80%**

**MA6151**

**MATHEMATICS – I**

**LT P C  
3 1 0 4**

**OBJECTIVES:**

- To develop the use of matrix algebra techniques this is needed by engineers for practical applications.
- To make the student knowledgeable in the area of infinite series and their convergence so that he/ she will be familiar with limitations of using infinite series approximations for solutions arising in mathematical modeling.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To introduce the concepts of improper integrals, Gamma, Beta and Error functions which are needed in engineering applications.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.

**UNIT I MATRICES**

**9+3**

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

**UNIT II SEQUENCES AND SERIES**

**9+3**

Sequences: Definition and examples – Series: Types and Convergence – Series of positive terms – Tests of convergence: Comparison test, Integral test and D’Alembert’s ratio test – Alternating series – Leibnitz’s test – Series of positive and negative terms – Absolute and conditional convergence.

**UNIT III APPLICATIONS OF DIFFERENTIAL CALCULUS**

**9+3**

Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature – Evolutes – Envelopes - Evolute as envelope of normals.

**UNIT IV DIFFERENTIAL CALCULUS OF SEVERAL VARIABLES**

**9+3**

Limits and Continuity – Partial derivatives – Total derivative – Differentiation of implicit functions – Jacobian and properties – Taylor’s series for functions of two variables – Maxima and minima of functions of two variables – Lagrange’s method of undetermined multipliers.

**UNIT V MULTIPLE INTEGRALS**

**9+3**

Double integrals in cartesian and polar coordinates – Change of order of integration – Area enclosed by plane curves – Change of variables in double integrals – Area of a curved surface - Triple integrals – Volume of Solids.

**TOTAL (L:45+T:15): 60 PERIODS**

**OUTCOME:**

- This course equips students to have basic knowledge and understanding in one fields of materials, integral and differential calculus.



**TEXT BOOKS:**

1. Bali N. P and Manish Goyal, "A Text book of Engineering Mathematics", Eighth Edition, Laxmi Publications Pvt Ltd., 2011.
2. Grewal. B.S, "Higher Engineering Mathematics", 41<sup>st</sup> Edition, Khanna Publications, Delhi, 2011.

**REFERENCES:**

1. Dass, H.K., and Er. Rajnish Verma," Higher Engineering Mathematics", S. Chand Private Ltd., 2011.
2. Glyn James, "Advanced Modern Engineering Mathematics", 3<sup>rd</sup> Edition, Pearson Education, 2012.
3. Peter V. O'Neil," Advanced Engineering Mathematics", 7th Edition, Cengage learning, 2012.
4. Ramana B.V, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, 2008.
5. Sivarama Krishna Das P. and Rukmangadachari E., "Engineering Mathematics", Volume I, Second Edition, PEARSON Publishing, 2011.

**PH6151****ENGINEERING PHYSICS – I****L T P C  
3 0 0 3****OBJECTIVES:**

- To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

**UNIT I CRYSTAL PHYSICS 9**

Lattice – Unit cell – Bravais lattice – Lattice planes – Miller indices – d spacing in cubic lattice – Calculation of number of atoms per unit cell – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC and HCP structures – Diamond and graphite structures (qualitative treatment) - Crystal growth techniques –solution, melt (Bridgman and Czochralski) and vapour growth techniques (qualitative)

**UNIT II PROPERTIES OF MATTER AND THERMAL PHYSICS 9**

Elasticity- Hooke's law - Relationship between three moduli of elasticity (qualitative) – stress - strain diagram – Poisson's ratio –Factors affecting elasticity –Bending moment – Depression of a cantilever –Young's modulus by uniform bending- I-shaped girders  
Modes of heat transfer- thermal conductivity- Newton's law of cooling - Linear heat flow – Lee's disc method – Radial heat flow – Rubber tube method – conduction through compound media (series and parallel)

**UNIT III QUANTUM PHYSICS 9**

Black body radiation – Planck's theory (derivation) – Deduction of Wien's displacement law and Rayleigh – Jeans' Law from Planck's theory – Compton effect. Theory and experimental verification – Properties of Matter waves – G.P Thomson experiment -Schrödinger's wave equation – Time independent and time dependent equations – Physical significance of wave function – Particle in a one dimensional box - Electron microscope - Scanning electron microscope - Transmission electron microscope.

**UNIT IV ACOUSTICS AND ULTRASONICS 9**

Classification of Sound- decibel- Weber–Fechner law – Sabine's formula- derivation using growth and decay method – Absorption Coefficient and its determination –factors affecting acoustics of buildings and their remedies.  
Production of ultrasonics by magnetostriction and piezoelectric methods - acoustic grating -Non Destructive Testing – pulse echo system through transmission and reflection modes - A,B and C – scan displays, Medical applications - Sonogram

**UNIT V PHOTONICS AND FIBRE OPTICS 9**

Spontaneous and stimulated emission- Population inversion -Einstein's A and B coefficients - derivation. Types of lasers – Nd:YAG, CO<sub>2</sub>, Semiconductor lasers (homojunction & heterojunction)- Industrial and Medical Applications.

Principle and propagation of light in optical fibres – Numerical aperture and Acceptance angle - Types of optical fibres (material, refractive index, mode) – attenuation, dispersion, bending - Fibre Optical Communication system (Block diagram) - Active and passive fibre sensors- Endoscope.

**TOTAL: 45 PERIODS****OUTCOME:**

- The students will have knowledge on the basics of physics related to properties of matter, optics, acoustics etc., and they will apply these fundamental principles to solve practical problems related to materials used for engineering applications.

**TEXT BOOKS:**

1. Arumugam M. Engineering Physics. Anuradha publishers, 2010
2. Gaur R.K. and Gupta S.L. Engineering Physics. Dhanpat Rai publishers, 2009
3. Mani Naidu S. Engineering Physics, Second Edition, PEARSON Publishing, 2011.

**REFERENCES:**

1. Searls and Zemansky. University Physics, 2009
2. Mani P. Engineering Physics I. Dhanam Publications, 2011
3. Marikani A. Engineering Physics. PHI Learning Pvt., India, 2009
4. Palanisamy P.K. Engineering Physics. SCITECH Publications, 2011
5. Rajagopal K. Engineering Physics. PHI, New Delhi, 2011
6. Senthilkumar G. Engineering Physics I. VRB Publishers, 2011.

**CY6151****ENGINEERING CHEMISTRY - I****LT P C  
3 0 0 3****OBJECTIVES:**

- To make the students conversant with basics of polymer chemistry.
- To make the student acquire sound knowledge of second law of thermodynamics and second law based derivations of importance in engineering applications in all disciplines.
- To acquaint the student with concepts of important photophysical and photochemical processes and spectroscopy.
- To develop an understanding of the basic concepts of phase rule and its applications to single and two component systems and appreciate the purpose and significance of alloys.
- To acquaint the students with the basics of nano materials, their properties and applications.

**UNIT I POLYMER CHEMISTRY 9**

Introduction: Classification of polymers – Natural and synthetic; Thermoplastic and Thermosetting. Functionality – Degree of polymerization. Types and mechanism of polymerization: Addition (Free Radical, cationic and anionic); condensation and copolymerization. Properties of polymers: T<sub>g</sub>, Tacticity, Molecular weight – weight average, number average and polydispersity index. Techniques of polymerization: Bulk, emulsion, solution and suspension. Preparation, properties and uses of Nylon 6,6, and Epoxy resin.

**UNIT II CHEMICAL THERMODYNAMICS 9**

Terminology of thermodynamics - Second law: Entropy - entropy change for an ideal gas, reversible and irreversible processes; entropy of phase transitions; Clausius inequality. Free energy and work function: Helmholtz and Gibbs free energy functions (problems); Criteria of spontaneity; Gibbs-Helmholtz equation (problems); Clausius-Clapeyron equation; Maxwell relations – Van't Hoff isotherm and isochore(problems).

**UNIT III PHOTOCHEMISTRY AND SPECTROSCOPY 9**

Photochemistry: Laws of photochemistry - Grotthuss-Draper law, Stark-Einstein law and Lambert-Beer Law. Quantum efficiency – determination- Photo processes - Internal Conversion, Inter-

system crossing, Fluorescence, Phosphorescence, Chemiluminescence and Photo-sensitization. Spectroscopy: Electromagnetic spectrum - Absorption of radiation – Electronic, Vibrational and rotational transitions. UV-visible and IR spectroscopy – principles, instrumentation (Block diagram only).

#### **UNIT IV PHASE RULE AND ALLOYS**

**9**

Phase rule: Introduction, definition of terms with examples, One Component System- water system - Reduced phase rule - Two Component Systems- classification – lead-silver system, zinc-magnesium system. Alloys: Introduction- Definition- Properties of alloys- Significance of alloying, Functions and effect of alloying elements- Ferrous alloys- Nichrome and Stainless steel – heat treatment of steel; Non-ferrous alloys – brass and bronze.

#### **UNIT V NANO CHEMISTRY**

**9**

Basics - distinction between molecules, nanoparticles and bulk materials; size-dependent properties. Nanoparticles: nano cluster, nano rod, nanotube(CNT) and nanowire. Synthesis: precipitation, thermolysis, hydrothermal, solvothermal, electrode position, chemical vapour deposition, laser ablation; Properties and applications

**TOTAL :45 PERIODS**

#### **OUTCOME:**

- The knowledge gained on polymer chemistry, thermodynamics. spectroscopy, phase rule and nano materials will provide a strong platform to understand the concepts on these subjects for further learning.

#### **TEXT BOOKS:**

1. Jain P.C. and Monica Jain, "Engineering Chemistry", Dhanpat Rai Publishing Company (P) Ltd., New Delhi, 2010
2. Kannan P., Ravikrishnan A., "Engineering Chemistry", Sri Krishna Hi-tech Publishing Company Pvt. Ltd. Chennai, 2009

#### **REFERENCES:**

1. Dara S.S, Umare S.S, "Engineering Chemistry", S. Chand & Company Ltd., New Delhi 2010
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company, Ltd., New Delhi, 2008.
3. Gowariker V.R. , Viswanathan N.V. and JayadevSreedhar, "Polymer Science", New Age International P (Ltd.), Chennai, 2006.
4. Ozin G. A. and Arsenault A. C., "Nanotechnology: A Chemical Approach to Nanomaterials", RSC Publishing, 2005.

**GE6151**

**COMPUTER PROGRAMMING**

**L T P C**  
**3 0 0 3**

#### **OBJECTIVES:**

**The students should be made to:**

- Learn the organization of a digital computer.
- Be exposed to the number systems.
- Learn to think logically and write pseudo code or draw flow charts for problems.
- Be exposed to the syntax of C.
- Be familiar with programming in C.
- Learn to use arrays, strings, functions, pointers, structures and unions in C.

#### **UNIT I INTRODUCTION**

**8**

Generation and Classification of Computers- Basic Organization of a Computer –Number System – Binary – Decimal – Conversion – Problems. Need for logical analysis and thinking – Algorithm – Pseudo code – Flow Chart.

**UNIT II C PROGRAMMING BASICS 10**

Problem formulation – Problem Solving - Introduction to ‘C’ programming –fundamentals – structure of a ‘C’ program – compilation and linking processes – Constants, Variables – Data Types – Expressions using operators in ‘C’ – Managing Input and Output operations – 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. String- String operations – String Arrays. Simple programs- sorting- searching – matrix operations.

**UNIT IV FUNCTIONS AND POINTERS 9**

Function – definition of function – Declaration of function – Pass by value – Pass by reference – Recursion – Pointers - Definition – Initialization – Pointers arithmetic – Pointers and arrays- Example Problems.

**UNIT V STRUCTURES AND UNIONS 9**

Introduction – need for structure data type – structure definition – Structure declaration – Structure within a structure - Union - Programs using structures and Unions – Storage classes, Pre-processor directives.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

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

- Design C Programs for problems.
- Write and execute C programs for simple applications.

**TEXTBOOKS:**

1. Anita Goel and Ajay Mittal, “Computer Fundamentals and Programming in C”, Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
2. Pradip Dey, Manas Ghosh, “Fundamentals of Computing and Programming in C”, First Edition, Oxford University Press, 2009
3. Yashavant P. Kanetkar. “ Let Us C”, BPB Publications, 2011.

**REFERENCES:**

1. Byron S Gottfried, “Programming with C”, Schaum’s Outlines, Second Edition, Tata McGraw-Hill, 2006.
2. Dromey R.G., “How to Solve it by Computer”, Pearson Education, Fourth Reprint, 2007.
3. Kernighan,B.W and Ritchie,D.M, “The C Programming language”, Second Edition, Pearson Education, 2006.
4. Dr. M. Rajaram and P. Uma Maheswari, “Computer Programming with C”, Pearson, 2014.

**GE6152**

**ENGINEERING GRAPHICS**

**L T P C  
2 0 3 4**

**OBJECTIVES:**

- To develop in students, graphic skills for communication of concepts, ideas and design of Engineering products.
- To 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 AND FREE HAND SKETCHING 5+9**

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, Scales: Construction of Diagonal and Vernier scales.

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 5+9**

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 traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

**UNIT III PROJECTION OF SOLIDS 5+9**

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

**UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 5+9**

Sectioning of above 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 6+9**

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 .

**COMPUTER AIDED DRAFTING (Demonstration Only) 3**

Introduction to drafting packages and demonstration of their use.

**TOTAL: 75 PERIODS**

**OUTCOMES:**

On Completion of the course the student will be able to

- perform free hand sketching of basic geometrical constructions and multiple views of objects.
- do orthographic projection of lines and plane surfaces.
- draw projections and solids and development of surfaces.
- prepare isometric and perspective sections of simple solids.
- demonstrate computer aided drafting.

**TEXT BOOK:**

1. Bhatt N.D. and Panchal V.M., “Engineering Drawing”, Charotar Publishing House, 50<sup>th</sup> Edition, 2010.

**REFERENCES:**

1. Gopalakrishna K.R., “Engineering Drawing” (Vol. I&II combined), Subhas Stores, Bangalore, 2007.
2. Luzzader, Warren.J. and Duff,John M., “Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
3. Shah M.B., and Rana B.C., “Engineering Drawing”, Pearson, 2<sup>nd</sup> Edition, 2009.
4. Venugopal K. and Prabhu Raja V., “Engineering Graphics”, New Age International (P) Limited, 2008.
5. Natrajan K.V., “A text book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2009.

6. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.

**Publication of Bureau of Indian Standards:**

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing 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

**GE6161**

**COMPUTER PRACTICES LABORATORY**

**LT P C  
0 0 3 2**

**OBJECTIVES:**

**The student should be made to:**

- Be familiar with the use of Office software.
- Be exposed to presentation and visualization tools.
- Be exposed to problem solving techniques and flow charts.
- Be familiar with programming in C.
- Learn to use Arrays, strings, functions, structures and unions.

**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 – Includes Parameter Passing
9. Program using Recursive Function and conversion from given program to flow chart.
10. Program using structures and unions.

**TOTAL : 45 PERIODS**

**OUTCOMES:**

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

- Apply good programming design methods for program development.
- Design and implement C programs for simple applications.
- Develop recursive programs.

**LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS:**

Standalone desktops with C compiler      30 Nos.

(or)

Server with C compiler supporting 30 terminals or more.

**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 & MECHANICAL)****I CIVIL ENGINEERING PRACTICE****9****Buildings:**

- (a) Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

**Plumbing Works:**

- (a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
- (b) Study of pipe connections requirements for pumps and turbines.
- (c) Preparation of plumbing line sketches for water supply and sewage works.
- (d) Hands-on-exercise:

Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.

- (e) Demonstration of plumbing requirements of high-rise buildings.

**Carpentry using Power Tools only:**

- (a) Study of the joints in roofs, doors, windows and furniture.
- (b) Hands-on-exercise:

Wood work, joints by sawing, planing and cutting.

**II MECHANICAL ENGINEERING PRACTICE****13****Welding:**

- (a) Preparation of arc welding of butt joints, lap joints and tee joints.
- (b) Gas welding practice

**Basic Machining:**

- (a) Simple Turning and Taper turning
- (b) Drilling Practice

**Sheet Metal Work:**

- (a) Forming & Bending:
- (b) Model making – Trays, funnels, etc.
- (c) Different type of joints.

**Machine assembly practice:**

- (a) Study of centrifugal pump
- (b) Study of air conditioner

**Demonstration on:**

- (a) Smithy operations, upsetting, swaging, setting down and bending. Example – Exercise – Production of hexagonal headed bolt.
- (b) Foundry operations like mould preparation for gear and step cone pulley.
- (c) Fitting – Exercises – Preparation of square fitting and vee – fitting models.

## GROUP B (ELECTRICAL & ELECTRONICS)

- III ELECTRICAL ENGINEERING PRACTICE 10**
1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
  2. Fluorescent lamp wiring.
  3. Stair case wiring
  4. Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
  5. Measurement of energy using single phase energy meter.
  6. Measurement of resistance to earth of an electrical equipment.
- IV ELECTRONICS ENGINEERING PRACTICE 13**
1. Study of Electronic components and equipments – Resistor, colour coding measurement of AC signal parameter (peak-peak, rms period, frequency) using CR.
  2. Study of logic gates AND, OR, EOR and NOT.
  3. Generation of Clock Signal.
  4. Soldering practice – Components Devices and Circuits – Using general purpose PCB.
  5. Measurement of ripple factor of HWR and FWR.

**TOTAL: 45 PERIODS**

### OUTCOMES:

- ability to fabricate carpentry components and pipe connections including plumbing works.
- ability to use welding equipments to join the structures.
- ability to fabricate electrical and electronics circuits.

### REFERENCES:

1. Jeyachandran K., Natarajan S. & Balasubramanian S., “A Primer on Engineering Practices Laboratory”, Anuradha Publications, 2007.
2. Jeyapooan T., Saravanapandian M. & Pranitha S., “Engineering Practices Lab Manual”, Vikas PUBLISHING House Pvt.Ltd, 2006.
3. Bawa H.S., “Workshop Practice”, Tata McGraw – Hill Publishing Company Limited, 2007.
4. Rajendra Prasad A. & Sarma P.M.M.S., “Workshop Practice”, Sree Sai Publication, 2002.
5. Kannaiah P. & Narayana K.L., “Manual on Workshop Practice”, Scitech Publications, 1999.

### LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

#### CIVIL

- |   |          |
|---|----------|
| 1. Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings. | 15 Sets. |
| 2. Carpentry vice (fitted to work bench)  | 15 Nos.  |
| 3. Standard woodworking tools   | 15 Sets. |
| 4. Models of industrial trusses, door joints, furniture joints  | 5 each   |
| 5. Power Tools: (a) Rotary Hammer   | 2 Nos    |
| (b) Demolition Hammer   | 2 Nos    |
| (c) Circular Saw  | 2 Nos    |
| (d) Planer  | 2 Nos    |
| (e) Hand Drilling Machine   | 2 Nos    |
| (f) Jigsaw  | 2 Nos    |

#### MECHANICAL

- |   |         |
|---|---------|
| 1. Arc welding transformer with cables and holders                            | 5 Nos.  |
| 2. Welding booth with exhaust facility  | 5 Nos.  |
| 3. Welding accessories like welding shield, chipping hammer, wire brush, etc. | 5 Sets. |



- |  |           |
|--|-----------|
| 4. Oxygen and acetylene gas cylinders, blow pipe and other welding outfit. | 2 Nos.    |
| 5. Centre lathe  | 2 Nos.    |
| 6. Hearth furnace, anvil and smithy tools                                  | 2 Sets.   |
| 7. Moulding table, foundry tools   | 2 Sets.   |
| 8. Power Tool: Angle Grinder   | 2 Nos     |
| 9. Study-purpose items: centrifugal pump, air-conditioner                  | One each. |

#### **ELECTRICAL**

- |  |         |
|--|---------|
| 1. Assorted electrical components for house wiring                         | 15 Sets |
| 2. Electrical measuring instruments  | 10 Sets |
| 3. Study purpose items: Iron box, fan and regulator, emergency lamp 1 each |         |
| 4. Megger (250V/500V)  | 1 No.   |
| 5. Power Tools: (a) Range Finder   | 2 Nos   |
| (b) Digital Live-wire detector   | 2 Nos   |

#### **ELECTRONICS**

- |   |         |
|---|---------|
| 1. Soldering guns   | 10 Nos. |
| 2. Assorted electronic components for making circuits                 | 50 Nos. |
| 3. Small PCBs   | 10 Nos. |
| 4. Multimeters  | 10 Nos. |
| 5. Study purpose items: Telephone, FM radio, low-voltage power supply |         |

**GE6163**

**PHYSICS AND CHEMISTRY LABORATORY – I**

**LT P C  
0 0 2 1**

**PHYSICS LABORATORY – I**

#### **OBJECTIVES:**

- To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics and properties of matter.

#### **LIST OF EXPERIMENTS**

(Any FIVE Experiments)

1. (a) Determination of Wavelength, and particle size using Laser  
(b) Determination of acceptance angle in an optical fiber.
2. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer.
3. Determination of wavelength of mercury spectrum – spectrometer grating
4. Determination of thermal conductivity of a bad conductor – Lee's Disc method.
5. Determination of Young's modulus by Non uniform bending method
6. Determination of specific resistance of a given coil of wire – Carey Foster's Bridge

#### **OUTCOME:**

- The hands on exercises undergone by the students will help them to apply physics principles of optics and thermal physics to evaluate engineering properties of materials.

#### **LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:**

1. Diode laser, lycopodium powder, glass plate, optical fiber.
2. Ultrasonic interferometer
3. Spectrometer, mercury lamp, grating
4. Lee's Disc experimental set up
5. Traveling microscope, meter scale, knife edge, weights
6. Carey foster's bridge set up  
(vernier Caliper, Screw gauge, reading lens are required for most of the experiments)

## CHEMISTRY LABORATORY- I

### OBJECTIVES:

- To make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis.
- To acquaint the students with the determination of molecular weight of a polymer by vacometry.

### LIST OF EXPERIMENTS

(Any FIVE Experiments)

- 1 Determination of DO content of water sample by Winkler's method.
- 2 Determination of chloride content of water sample by argentometric method.
- 3 Determination of strength of given hydrochloric acid using pH meter.
- 4 Determination of strength of acids in a mixture using conductivity meter.
- 5 Estimation of iron content of the water sample using spectrophotometer. (1,10- phenanthroline / thiocyanate method).
- 6 Determination of molecular weight of polyvinylalcohol using Ostwald viscometer.
- 7 Conductometric titration of strong acid vs strong base.

**TOTAL: 30 PERIODS**

### OUTCOME:

- The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters.

### REFERENCES:

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 1994.
3. Jeffery G.H., Bassett J., Mendham J. and Denny vogel's R.C, "Text book of quantitative analysis chemical analysis", ELBS 5th Edn. Longman, Singapore publishers, Singapore, 1996.
4. Kolthoff I.M., Sandell E.B. et al. "Quantitative chemical analysis", Mcmillan, Madras 1980.

### LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1. Iodine flask	-	30 Nos
2. pH meter	-	5 Nos
3. Conductivity meter	-	5 Nos
4. Spectrophotometer	-	5 Nos
5. Ostwald Viscometer	-	10 Nos

**Common Apparatus : Pipette, Burette, conical flask, porcelain tile, dropper (each 30 Nos.)**

**OBJECTIVES:**

- To make learners acquire listening and speaking skills in both formal and informal contexts.
- To help them develop their reading skills by familiarizing them with different types of reading strategies.
- To equip them with writing skills needed for academic as well as workplace contexts.
- To make them acquire language skills at their own pace by using e-materials and language lab components.

**UNIT I****9+3**

Listening - Listening to informal conversations and participating; Speaking - Opening a conversation (greetings, comments on topics like weather) - Turn taking - Closing a conversation (excuses, general wish, positive comment, thanks); Reading - Developing analytical skills, Deductive and inductive reasoning - Extensive reading; Writing - Effective use of SMS for sending short notes and messages - Using 'emoticons' as symbols in email messages; Grammar - Regular and irregular verbs - Active and passive voice; Vocabulary - Homonyms (e.g. 'can') - Homophones (e.g. 'some', 'sum'); E-materials - Interactive exercise on Grammar and vocabulary - blogging; Language Lab - Listening to different types of conversation and answering questions.

**UNIT II****9+3**

Listening - Listening to situation based dialogues; Speaking - Conversation practice in real life situations, asking for directions (using polite expressions), giving directions (using imperative sentences), Purchasing goods from a shop, Discussing various aspects of a film (they have already seen) or a book (they have already read); Reading - Reading a short story or an article from newspaper, Critical reading, Comprehension skills; Writing - Writing a review / summary of a story / article, Personal letter (Inviting your friend to a function, congratulating someone for his / her success, thanking one's friends / relatives); Grammar - modal verbs, Purpose expressions; Vocabulary - Phrasal verbs and their meanings, Using phrasal verbs in sentences; E-materials - Interactive exercises on Grammar and vocabulary, Extensive reading activity (reading stories / novels), Posting reviews in blogs - Language Lab - Dialogues (Fill up exercises), Recording students' dialogues.

**UNIT III****9+3**

Listening - Listening to the conversation - Understanding the structure of conversations; Speaking - Conversation skills with a sense of stress, intonation, pronunciation and meaning - Seeking information – expressing feelings (affection, anger, regret, etc.); Reading - Speed reading – reading passages with time limit - Skimming; Writing - Minutes of meeting – format and practice in the preparation of minutes - Writing summary after reading articles from journals - Format for journal articles – elements of technical articles (abstract, introduction, methodology, results, discussion, conclusion, appendices, references) - Writing strategies; Grammar - Conditional clauses - Cause and effect expressions; Vocabulary - Words used as nouns and verbs without any change in the spelling (e.g. 'rock', 'train', 'ring'); E-materials - Interactive exercise on Grammar and vocabulary - Speed Reading practice exercises; Language Lab - Intonation practice using EFLU and RIE materials – Attending a meeting and writing minutes.

**UNIT IV****9+3**

Listening - Listening to a telephone conversation, Viewing model interviews (face-to-face, telephonic and video conferencing); Speaking - Role play practice in telephone skills - listening and responding, -asking questions, -note taking – passing on messages, Role play and mock interview for grasping interview skills; Reading - Reading the job advertisements and the profile of the company concerned – scanning; Writing - Applying for a job – cover letter - résumé preparation – vision, mission and goals of the candidate; Grammar - Numerical expressions - Connectives (discourse markers); Vocabulary - Idioms and their meanings – using idioms in sentences; E-materials - Interactive exercises on Grammar and Vocabulary - Different forms of résumés- Filling up a résumé / cover letter; Language Lab - Telephonic interview – recording the responses - e-résumé writing.

**UNIT V****9+3**

Listening - Viewing a model group discussion and reviewing the performance of each participant - Identifying the characteristics of a good listener; Speaking - Group discussion skills – initiating the

discussion – exchanging suggestions and proposals – expressing dissent/agreement – assertiveness in expressing opinions – mind mapping technique; Reading - Note making skills – making notes from books, or any form of written materials - Intensive reading; Writing – Checklist - Types of reports – Feasibility / Project report – report format – recommendations / suggestions – interpretation of data (using charts for effective presentation); Grammar - Use of clauses; Vocabulary – Collocation; E-materials - Interactive grammar and vocabulary exercises - Sample GD - Pictures for discussion, Interactive grammar and vocabulary exercises; Language Lab - Different models of group discussion.

**TOTAL (L:45+T:15): 60 PERIODS**

### **OUTCOMES:**

Learners should be able to

- speak convincingly, express their opinions clearly, initiate a discussion, negotiate, argue using appropriate communicative strategies.
- write effectively and persuasively and produce different types of writing such as narration, description, exposition and argument as well as creative, critical, analytical and evaluative writing.
- read different genres of texts, infer implied meanings and critically analyse and evaluate them for ideas as well as for method of presentation.
- listen/view and comprehend different spoken excerpts critically and infer unspoken and implied meanings.

### **TEXTBOOKS:**

1. Department of English, Anna University. Mindscapes: English for Technologists and Engineers. Orient Blackswan, Chennai. 2012
2. Dhanavel, S.P. English and Communication Skills for Students of Science and Engineering. Orient Blackswan, Chennai. 2011

### **REFERENCES:**

1. Anderson, Paul V. Technical Communication: A Reader-Centered Approach. Cengage. New Delhi. 2008
2. Muralikrishna, & Sunita Mishra. Communication Skills for Engineers. Pearson, New Delhi. 2011
3. Riordan, Daniel. G. Technical Communication. Cengage Learning, New Delhi. 2005
4. Sharma, Sangeetha & Binod Mishra. Communication Skills for Engineers and Scientists. PHI Learning, New Delhi. 2009
5. Smith-Worthington, Darlene & Sue Jefferson. Technical Writing for Success. Cengage, Mason USA. 2007

### **EXTENSIVE Reading (Not for Examination)**

1. Khera, Shiv. You can Win. Macmillan, Delhi. 1998.

### **Websites**

1. <http://www.englishclub.com>
2. <http://owl.english.purdue.edu>

### **TEACHING METHODS:**

- Lectures
- Activities conducted individually, in pairs and in groups like individual writing and presentations, group discussions, interviews, reporting, etc
- Long presentations using visual aids
- Listening and viewing activities with follow up activities like discussions, filling up worksheets, writing exercises (using language lab wherever necessary/possible) etc
- Projects like group reports, mock interviews etc using a combination of two or more of the language skills

## EVALUATION PATTERN:

### Internal assessment: 20%

3 tests of which two are pen and paper tests and the other is a combination of different modes of assessment like

- Project
- Assignment
- Report
- Creative writing, etc.

All the four skills are to be tested with equal weightage given to each.

- ✓ Speaking assessment: Individual presentations, Group discussions
- ✓ Reading assessment: Reading passages with comprehension questions graded following Bloom's taxonomy
- ✓ Writing assessment: Writing essays, CVs, reports etc. Writing should include grammar and vocabulary.
- ✓ Listening/Viewing assessment: Lectures, dialogues, film clippings with questions on verbal as well as audio/visual content graded following Bloom's taxonomy.

### End Semester Examination: 80%

**MA6251**

**MATHEMATICS – II**

**L T P C**  
**3 1 0 4**

### OBJECTIVES:

- To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.
- 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 VECTOR CALCULUS

**9+3**

Gradient, divergence and curl – Directional derivative – Irrotational and solenoidal vector fields – Vector integration – Green's theorem in a plane, Gauss divergence theorem and Stokes' theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelepipeds.

### UNIT II ORDINARY DIFFERENTIAL EQUATIONS

**9+3**

Higher order linear differential equations with constant coefficients – Method of variation of parameters – Cauchy's and Legendre's linear equations – Simultaneous first order linear equations with constant coefficients.

### UNIT III LAPLACE TRANSFORM

**9+3**

Laplace transform – Sufficient condition for existence – Transform of elementary functions – Basic properties – Transforms of derivatives and integrals of functions - Derivatives and integrals of transforms - Transforms of unit step function and impulse functions – Transform of periodic functions. Inverse Laplace transform -Statement of Convolution theorem – Initial and final value theorems – Solution of linear ODE of second order with constant coefficients using Laplace transformation techniques.

**UNIT IV ANALYTIC FUNCTIONS****9+3**

Functions of a complex variable – Analytic functions: Necessary conditions – Cauchy-Riemann equations and sufficient conditions (excluding proofs) – Harmonic and orthogonal properties of analytic function – Harmonic conjugate – Construction of analytic functions – Conformal mapping:  $w = z+k$ ,  $kz$ ,  $1/z$ ,  $z^2$ ,  $e^z$  and bilinear transformation.

**UNIT V COMPLEX INTEGRATION****9+3**

Complex integration – Statement and applications of Cauchy's integral theorem and Cauchy's integral formula – Taylor's and Laurent's series expansions – Singular points – Residues – Cauchy's residue theorem – Evaluation of real definite integrals as contour integrals around unit circle and semi-circle (excluding poles on the real axis).

**TOTAL (L:45+T:15): 60 PERIODS****OUTCOMES:**

- The subject helps the students to develop the fundamentals and basic concepts in vector calculus, ODE, Laplace transform and complex functions. Students will be able to solve problems related to engineering applications by using these techniques.

**TEXT BOOKS:**

1. Bali N. P and Manish Goyal, "A Text book of Engineering Mathematics", Eighth Edition, Laxmi Publications Pvt Ltd., 2011.
2. Grewal. B.S, "Higher Engineering Mathematics", 41<sup>st</sup> Edition, Khanna Publications, Delhi, 2011.

**REFERENCES:**

1. Dass, H.K., and Er. Rajnish Verma," Higher Engineering Mathematics", S. Chand Private Ltd., 2011
2. Glyn James, "Advanced Modern Engineering Mathematics", 3<sup>rd</sup> Edition, Pearson Education, 2012.
3. Peter V. O'Neil," Advanced Engineering Mathematics", 7th Edition, Cengage learning, 2012.
4. Ramana B.V, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, 2008.
5. Sivarama Krishna Das P. and Rukmangadachari E., "Engineering Mathematics" Volume II, Second Edition, PEARSON Publishing, 2011.

**PH6251****ENGINEERING PHYSICS – II****L T P C  
3 0 0 3****OBJECTIVES:**

- To enrich the understanding of various types of materials and their applications in engineering and technology.

**UNIT I CONDUCTING MATERIALS****9**

Conductors – classical free electron theory of metals – Electrical and thermal conductivity – Wiedemann – Franz law – Lorentz number – Draw backs of classical theory – Quantum theory – Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states – carrier concentration in metals.

**UNIT II SEMICONDUCTING MATERIALS****9**

Intrinsic semiconductor – carrier concentration derivation – Fermi level – Variation of Fermi level with temperature – electrical conductivity – band gap determination – compound semiconductors - direct and indirect band gap- derivation of carrier concentration in n-type and p-type



**UNIT II ELECTROCHEMISTRY AND CORROSION 9**

Electrochemical cell - redox reaction, electrode potential- origin of electrode potential- oxidation potential- reduction potential, measurement and applications - electrochemical series and its significance - Nernst equation (derivation and problems). Corrosion- causes- factors- types- chemical, electrochemical corrosion (galvanic, differential aeration), corrosion control - material selection and design aspects - electrochemical protection – sacrificial anode method and impressed current cathodic method. Paints- constituents and function. Electroplating of Copper and electroless plating of nickel.

**UNIT III ENERGY SOURCES 9**

Introduction- nuclear energy- nuclear fission- controlled nuclear fission- nuclear fusion- differences between nuclear fission and fusion- nuclear chain reactions- nuclear reactor power generator- classification of nuclear reactor- light water reactor- breeder reactor- solar energy conversion- solar cells- wind energy. Batteries and fuel cells: Types of batteries- alkaline battery- lead storage battery- nickel-cadmium battery- lithium battery- fuel cell  $H_2$ - $O_2$  fuel cell- applications.

**UNIT IV ENGINEERING MATERIALS 9**

Abrasives: definition, classification or types, grinding wheel, abrasive paper and cloth. Refractories: definition, characteristics, classification, properties – refractoriness and RUL, dimensional stability, thermal spalling, thermal expansion, porosity; Manufacture of alumina, magnesite and silicon carbide, Portland cement- manufacture and properties - setting and hardening of cement, special cement- waterproof and white cement–properties and uses. Glass - manufacture, types, properties and uses.

**UNIT V FUELS AND COMBUSTION 9**

Fuel: Introduction- classification of fuels- calorific value- higher and lower calorific values- coal-analysis of coal (proximate and ultimate)- carbonization- manufacture of metallurgical coke (Otto Hoffmann method) - petroleum- manufacture of synthetic petrol (Bergius process)- knocking-octane number - diesel oil- cetane number - natural gas- compressed natural gas(CNG)- liquefied petroleum gases(LPG)- producer gas- water gas. Power alcohol and bio diesel. Combustion of fuels: introduction- theoretical calculation of calorific value- calculation of stoichiometry of fuel and air ratio- ignition temperature- explosive range - flue gas analysis (ORSAT Method).

**TOTAL: 45 PERIODS****OUTCOME:**

- The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.

**TEXT BOOKS:**

1. Vairam S, Kalyani P and SubaRamesh.,“Engineering Chemistry”., Wiley India PvtLtd.,New Delhi., 2011
2. DaraS.S,UmareS.S.“Engineering Chemistry”, S. Chand & Company Ltd., New Delhi , 2010

**REFERENCES:**

- 1 Kannan P. and Ravikrishnan A., “Engineering Chemistry”, Sri Krishna Hi-tech Publishing Company Pvt. Ltd. Chennai, 2009
2. AshimaSrivastava and Janhavi N N., “Concepts of Engineering Chemistry”, ACME Learning Private Limited., New Delhi., 2010.
3. RenuBapna and Renu Gupta., “Engineering Chemistry”, Macmillan India Publisher Ltd., 2010.
- 4 Pahari A and Chauhan B., “Engineering Chemistry”., Firewall Media., New Delhi., 2010



**OBJECTIVES:**

- To explain the basic theorems used in Electrical circuits and the different components and function of electrical machines.
- To explain the fundamentals of semiconductor and applications.
- To explain the principles of digital electronics
- To impart knowledge of communication.

**UNIT I ELECTRICAL CIRCUITS & MEASUREMENTS 12**

Ohm's Law – Kirchoff's Laws – Steady State Solution of DC Circuits – Introduction to AC Circuits – Waveforms and RMS Value – Power and Power factor – Single Phase and Three Phase Balanced Circuits.

Operating Principles of Moving Coil and Moving Iron Instruments (Ammeters and Voltmeters), Dynamometer type Watt meters and Energy meters.

**UNIT II ELECTRICAL MECHANICS 12**

Construction, Principle of Operation, Basic Equations and Applications of DC Generators, DC Motors, Single Phase Transformer, single phase induction Motor.

**UNIT III SEMICONDUCTOR DEVICES AND APPLICATIONS 12**

Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics – Half wave and Full wave Rectifiers – Voltage Regulation.

Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics – Elementary Treatment of Small Signal Amplifier.

**UNIT IV DIGITAL ELECTRONICS 12**

Binary Number System – Logic Gates – Boolean Algebra – Half and Full Adders – Flip-Flops – Registers and Counters – A/D and D/A Conversion (single concepts)

**UNIT V FUNDAMENTALS OF COMMUNICATION ENGINEERING 12**

Types of Signals: Analog and Digital Signals – Modulation and Demodulation: Principles of Amplitude and Frequency Modulations.

Communication Systems: Radio, TV, Fax, Microwave, Satellite and Optical Fibre (Block Diagram Approach only).

**TOTAL: 60 PERIODS****OUTCOMES:**

- ability to identify the electrical components explain the characteristics of electrical machines.
- ability to identify electronics components and use of them to design circuits.

**TEXT BOOKS:**

1. Mittle N., "Basic Electrical Engineering", Tata McGraw Hill Edition, New Delhi, 1990.
2. Sedha R.S., "Applied Electronics", S. Chand & Co., 2006.

**REFERENCES:**

1. Muthusubramanian R, Salivahanan S and Muraleedharan K A, "Basic Electrical, Electronics and Computer Engineering", Tata McGraw Hill, Second Edition, 2006.
2. Nagsarkar T K and Sukhija M S, "Basics of Electrical Engineering", Oxford press 2005.
3. Mehta V K, "Principles of Electronics", S.Chand & Company Ltd, 1994.
4. Mahmood Nahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series, McGraw Hill, 2002.
5. Premkumar N, "Basic Electrical Engineering", Anuradha Publishers, 2003.

**OBJECTIVES:**

- To develop capacity to predict the effect of force and motion in the course of carrying out the design functions of engineering.

**UNIT I BASICS AND STATICS OF PARTICLES 12**

Introduction – Units and Dimensions – Laws of Mechanics – Lami's theorem, Parallelogram and triangular Law of forces — Vectorial representation of forces – Vector operations of forces - additions, subtraction, dot product, cross product – Coplanar Forces – rectangular components – Equilibrium of a particle – Forces in space – Equilibrium of a particle in space – Equivalent systems of forces – Principle of transmissibility .

**UNIT II EQUILIBRIUM OF RIGID BODIES 12**

Free body diagram – Types of supports –Action and reaction forces –stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar components of a moment – Varignon's theorem – Single equivalent force -Equilibrium of Rigid bodies in two dimensions – Equilibrium of Rigid bodies in three dimensions

**UNIT III PROPERTIES OF SURFACES AND SOLIDS 12**

Centroids and centre of mass– Centroids of lines and areas - Rectangular, circular, triangular areas by integration – T section, I section, - Angle section, Hollow section by using standard formula –Theorems of Pappus - Area moments of inertia of plane areas – Rectangular, circular, triangular areas by integration – T section, I section, Angle section, Hollow section by using standard formula – Parallel axis theorem and perpendicular axis theorem –Principal moments of inertia of plane areas – Principal axes of inertia-Mass moment of inertia –mass moment of inertia for prismatic, cylindrical and spherical solids from first principle – Relation to area moments of inertia.

**UNIT IV DYNAMICS OF PARTICLES 12**

Displacements, Velocity and acceleration, their relationship – Relative motion – Curvilinear motion - Newton's laws of motion – Work Energy Equation– Impulse and Momentum – Impact of elastic bodies.

**UNIT V FRICTION AND ELEMENTS OF RIGID BODY DYNAMICS 12**

Friction force – Laws of sliding friction – equilibrium analysis of simple systems with sliding friction –wedge friction-. Rolling resistance -Translation and Rotation of Rigid Bodies – Velocity and acceleration – General Plane motion of simple rigid bodies such as cylinder, disc/wheel and sphere.

**TOTAL : 60 PERIODS****OUTCOMES:**

- ability to explain the differential principles applies to solve engineering problems dealing with force, displacement, velocity and acceleration.
- ability to analyse the forces in any structures.
- ability to solve rigid body subjected to dynamic forces.

**TEXT BOOKS:**

1. Beer, F.P and Johnston Jr. E.R., "Vector Mechanics for Engineers (In SI Units): Statics and Dynamics", 8<sup>th</sup> Edition, Tata McGraw-Hill Publishing company, New Delhi (2004).
2. Vela Murali, "Engineering Mechanics", Oxford University Press (2010)

**REFERENCES:**

1. Hibbeler, R.C and Ashok Gupta, "Engineering Mechanics: Statics and Dynamics", 11<sup>th</sup> Edition, Pearson Education 2010.
2. Irving H. Shames and Krishna Mohana Rao. G., "Engineering Mechanics – Statics and Dynamics", 4<sup>th</sup> Edition, Pearson Education 2006.

3. Meriam J.L. and Kraige L.G., " Engineering Mechanics- Statics - Volume 1, Dynamics- Volume 2", Third Edition, John Wiley & Sons,1993.
4. Rajasekaran S and Sankarasubramanian G., "Engineering Mechanics Statics and Dynamics", 3<sup>rd</sup> Edition, Vikas Publishing House Pvt. Ltd., 2005.
5. Bhavikatti, S.S and Rajashekarappa, K.G., "Engineering Mechanics", New Age International (P) Limited Publishers, 1998.
6. Kumar, K.L., "Engineering Mechanics", 3<sup>rd</sup> Revised Edition, Tata McGraw-Hill Publishing company, New Delhi 2008.

**GE6261**

**COMPUTER AIDED DRAFTING AND MODELING LABORATORY**

**LT P C  
0 1 2 2**

**OBJECTIVES:**

- To develop skill to use software to create 2D and 3D models.

**List of Exercises using software capable of Drafting and Modeling**

1. Study of capabilities of software for Drafting and Modeling – Coordinate systems (absolute, relative, polar, etc.) – Creation of simple figures like polygon and general multi-line figures.
2. Drawing of a Title Block with necessary text and projection symbol.
3. Drawing of curves like parabola, spiral, involute using Bspline or cubic spline.
4. Drawing of front view and top view of simple solids like prism, pyramid, cylinder, cone, etc, and dimensioning.
5. Drawing front view, top view and side view of objects from the given pictorial views (eg. V-block, Base of a mixie, Simple stool, Objects with hole and curves).
6. Drawing of a plan of residential building ( Two bed rooms, kitchen, hall, etc.)
7. Drawing of a simple steel truss.
8. Drawing sectional views of prism, pyramid, cylinder, cone, etc,
9. Drawing isometric projection of simple objects.
10. Creation of 3-D models of simple objects and obtaining 2-D multi-view drawings from 3-D model.

Note: Plotting of drawings must be made for each exercise and attached to the records written by students.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

- ability to use the software packers for drafting and modeling
- ability to create 2D and 3D models of Engineering Components

**LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:**

<b>Sl.No</b>	<b>Description of Equipment</b>	<b>Quantity</b>
1.	Pentium IV computer or better hardware, with suitable graphics facility	30 No.
2.	Licensed software for Drafting and Modeling.	30 Licenses
3.	Laser Printer or Plotter to print / plot drawings	2 No.

**PHYSICS LABORATORY – II****OBJECTIVES:**

- To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics and properties of matter.

**LIST OF EXPERIMENTS****(Any FIVE Experiments)**

- Determination of Young's modulus by uniform bending method
- Determination of band gap of a semiconductor
- Determination of Coefficient of viscosity of a liquid –Poiseuille's method
- Determination of Dispersive power of a prism - Spectrometer
- Determination of thickness of a thin wire – Air wedge method
- Determination of Rigidity modulus – Torsion pendulum

**OUTCOME:**

- The students will have the ability to test materials by using their knowledge of applied physics principles in optics and properties of matter.

**LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:**

- Traveling microscope, meter scale, Knife edge, weights
- Band gap experimental set up
- Burette, Capillary tube, rubber tube, stop clock, beaker and weighing balance
- spectrometer, prism, sodium vapour lamp.
- Air-wedge experimental set up.
- Torsion pendulum set up.  
(vernier Caliper, Screw gauge, reading lens are required for most of the experiments)

**CHEMISTRY LABORATORY - II****OBJECTIVES:**

- To make the student acquire practical skills in the wet chemical and instrumental methods for quantitative estimation of hardness, alkalinity, metal ion content, corrosion in metals and cement analysis.

**LIST OF EXPERIMENTS****(Any FIVE Experiments)**

- Determination of alkalinity in water sample
- Determination of total, temporary & permanent hardness of water by EDTA method
- Estimation of copper content of the given solution by EDTA method
- Estimation of iron content of the given solution using potentiometer
- Estimation of sodium present in water using flame photometer
- Corrosion experiment – weight loss method
- Conductometric precipitation titration using  $\text{BaCl}_2$  and  $\text{Na}_2\text{SO}_4$
- Determination of CaO in Cement.

**TOTAL: 30 PERIODS**

**OUTCOME:**

- The students will be conversant with hands-on knowledge in the quantitative chemical analysis of water quality related parameters, corrosion measurement and cement analysis.

**REFERENCES:**

- Daniel R. Palleros, "Experimental organic chemistry" John Wiley & Sons, Inc., New York, 2001.
  - Furniss B.S. Hannaford A.J, Smith P.W.G and Tatchel A.R., "Vogel's Textbook of practical organic chemistry, LBS Singapore ,1994.
  - Jeffery G.H, Bassett J., Mendham J. and Denny R.C., "Vogel's Text book of quantitative analysis chemical analysis", ELBS 5th Edn. Longman, Singapore publishers, Singapore, 1996.
  - Kolthoff I.M. and Sandell E.B. et al. Quantitative chemical analysis, McMillan, Madras 1980
- Laboratory classes on alternate weeks for Physics and Chemistry.**

**LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:**

1. Potentiometer	-	5 Nos
2. Flame photo meter	-	5 Nos
3. Weighing Balance	-	5 Nos
4. Conductivity meter	-	5 Nos

**Common Apparatus : Pipette, Burette, conical flask, porcelain tile, dropper (30 Nos each)**

**GE6263**

**COMPUTER PROGRAMMING LABORATORY**

**L T P C**  
**0 1 2 2**

**OBJECTIVES:**

**The Students should be made to**

- Be exposed to Unix shell commands
- Be familiar with an editor on Unix
- Learn to program in Shell script
- Learn to write C programme for Unix platform

**LIST OF EXPERIMENTS**

<b>1. UNIX COMMANDS</b>	<b>15</b>
Study of Unix OS - Basic Shell Commands - Unix Editor	
<b>2. SHELL PROGRAMMING</b>	<b>15</b>
Simple Shell program - Conditional Statements - Testing and Loops	
<b>3. C PROGRAMMING ON UNIX</b>	<b>15</b>
Dynamic Storage Allocation-Pointers-Functions-File Handling	

**TOTAL: 45 PERIODS**

**OUTCOMES:**

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

- Use Shell commands
- Design of Implement Unix shell scripts
- Write and execute C programs on Unix

## **HARDWARE / SOFTWARE REQUIREMENTS FOR A BATCH OF 30 STUDENTS**

### **Hardware**

- 1 UNIX Clone Server
- 33 Nodes (thin client or PCs)
- Printer – 3 Nos.

### **Software**

- OS – UNIX Clone (33 user license or License free Linux)
- Compiler - C

**MA6468**

**PROBABILITY AND STATISTICS**

**LT P C**

**3 1 0 4**

### **OBJECTIVES:**

- This course aims at providing the required skill to apply the statistical tools in engineering problems.

### **UNIT I          RANDOM VARIABLES**

**9 + 3**

Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and Normal distributions.

### **UNIT II          TWO - DIMENSIONAL RANDOM VARIABLES**

**9 + 3**

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          TESTING OF HYPOTHESIS**

**9 + 3**

Sampling distributions - Estimation of parameters - Statistical hypothesis - Large sample test based on Normal distribution for single mean and difference of means -Tests based on t, Chi-square and F distributions for mean, variance and proportion - Contingency table (test for independent) - Goodness of fit.

### **UNIT IV          DESIGN OF EXPERIMENTS**

**9 + 3**

One way and Two way classifications - Completely randomized design – Randomized block design – Latin square design -  $2^2$  factorial design.

### **UNIT V          STATISTICAL QUALITY CONTROL**

**9 + 3**

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

**TOTAL (L:45 + T:15): 60 PERIODS**

### **OUTCOME:**

The students will have a fundamental knowledge of the concepts of probability. Have knowledge of standard distributions which can describe real life phenomenon. Have the notion of sampling distributions and statistical techniques used in management problems.

### **TEXT BOOKS:**

1. Milton. J. S. and Arnold. J.C., "Introduction to Probability and Statistics", Tata McGraw Hill, 4th Edition, 2007.
2. Johnson. R.A. and Gupta. C.B., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 7th Edition, 2007.
3. Papoulis. A and Unnikrishnapillai. S., "Probability, Random Variables and Stochastic Processes " Mc Graw Hill Education India , 4th Edition, New Delhi , 2010.

**REFERENCES:**

1. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2012.
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", 3rd Edition, Elsevier, 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 Edition, 2004.

**FT6301****TEXTILE FIBRES****LT P C  
3 0 0 3****OBJECTIVE:**

- To facilitate the students to understand the structural features, investigation techniques of textile fibres, and their influence on the behaviour of textiles.

**UNIT I STRUCTURE OF FIBRES****6**

Study of structures of natural and man-made fibers – physical, chemical and morphological structures. Molecular conformations – planar zig-zag, helical, lamellar, and spherulite conformations.

**UNIT II STRUCTURE INVESTIGATION TECHNIQUES****12**

Transmission and Scanning electron microscopes-principle construction and working; X-ray diffraction techniques – X-ray analysis-estimation of crystallinity; Infrared radiation and dichroism.techniques – chemical element and group identification by transmittance and optical density methods. Molecular orientation estimation, Typical molecular structures of commercially important fibres.

**UNIT III MOISTURE ABSORPTION CHARACTERISTICS OF FIBRES****9**

Moisture absorption behaviour 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 orption – integral and differential, their relation; factors influencing heat of sorption - measurement of heat of sorption.

**UNIT IV TENSILE CHARACTERISTICS OF FIBRES****9**

Tensile characteristics –Study of strength, elongation, work of rupture, initial modulus, work actor and yield point. Stress-strain relations of natural and man-made fibres – influence of humidity and temperature on tensile characteristics. Time effects-study of creep phenomena.

**UNIT V ELASTIC RECOVERY BEHAVIOUR OF FIBRES****9**

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

**TOTAL : 45 PERIODS****OUTCOMES:**

Upon completion of the course, the students will be able

- To understand the molecular conformations of textile fibres
- To carryout structural investigations techniques
- To understand the moisture, tensile and elastic behaviour of textile fibres

**TEXTBOOKS:**

1. Morton W. E. and Hearle J. W. S., "Physical Properties of Textile Fibres", The Textile Institute, Washington D.C., 2008.
2. Meredith R. and Hearle J. W. S., "Physical Methods of Investigation of Textiles", Wiley Publication, New York, 1989
3. Raheel M. (ed.), "Modern Textile Characterization Methods", Marcel Dekker, 1995.





**OUTCOMES:**

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

- Carryout yarn numbering by different systems
- Understand the processes involved in the production of yarn using short staple spinning system
- Understand the details of machinery used for the production of yarn

**TEXTBOOKS:**

1. Klein W., Vol. 1-3, "The Technology of Short Staple Spinning", "A Practical Guide to Opening & Carding" and "A Practical Guide to Combing, Drawing, and Roving frame", The Textile Institute, Manchester, U.K., 1998.
2. Chattopadhyay R. (Ed), Advances in Technology of Yarn Production, NCUTE, IIT Delhi, 2002.
3. Klein W., Vol.4 -5, "A Practical Guide to Ring Spinning, 1987" and "New Spinning Systems, 1993" The Textile Institute, Manchester, 1987.
4. Gowda R.V.M, "New Spinning Systems", NCUTE, IIT Delhi, 2003.

**REFERENCES:**

1. Chattopadhyay R., Technology of Carding, NCUTE, IIT Delhi, 2003.
2. Chattopadhyay R. & Rengasamy R., "Spinning, Drawing, Combing & Roving, NCUTE Pilot Programme.
3. Salhotra K. R. & Chattopadhyay R., Book of papers on "Blowroom and Carding", IIT Delhi 1998.
4. Duraiswamy I, Chellamani P & Pavendhan A., "Cotton Ginning" Textile Progress, The Textile Institute, Manchester, U.K., 1993.
5. Lord P. R., Yarn Production: Science Technology and Economics", The Textile Institute, Manchester, U.K., 1999.

**GE6351****ENVIRONMENTAL SCIENCE AND ENGINEERING****L T P C  
3 0 0 3****OBJECTIVES:**

To the study of nature and the facts about environment.

- To finding and implementing 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****12**

Definition, scope and importance of Risk and hazards; Chemical hazards, Physical hazards, Biological hazards in the environment – concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers-Oxygen cycle and Nitrogen cycle – energy flow in the ecosystem – ecological succession processes – 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 10**

Definition – causes, effects and control measures of: (a) Air pollution (Atmospheric chemistry-Chemical composition of the atmosphere; Chemical and photochemical reactions in the atmosphere - formation of smog, PAN, acid rain, oxygen and ozone chemistry;- Mitigation procedures- Control of particulate and gaseous emission, Control of SO<sub>2</sub>, NO<sub>x</sub>, CO and HC) (b) Water pollution : Physical and chemical properties of terrestrial and marine water and their environmental significance; Water quality parameters – physical, chemical and biological; absorption of heavy metals - Water treatment processes. (c) Soil pollution - soil waste management: causes, effects and control measures of municipal solid wastes – (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards–role of an individual in prevention of pollution – pollution case studies –  
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 overutilization of surface and ground 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. Energy Conversion processes – Biogas – production and uses, anaerobic digestion; 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. Introduction to Environmental Biochemistry: Proteins – Biochemical degradation of pollutants, Bioconversion of pollutants.  
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 – 12 Principles of green chemistry- nuclear accidents and holocaust, case studies. – wasteland reclamation – consumerism and waste products – environment production act – Air act – Water act – Wildlife protection act – Forest conservation act –The Biomedical Waste (Management and Handling) Rules; 1998 and amendments- scheme of labeling of environmentally friendly products (Ecomark). enforcement machinery involved in environmental legislation- central and state pollution control boards- disaster management: floods, earthquake, cyclone and landslides.  
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 –Environmental impact analysis (EIA)- -GIS-remote sensing-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 environmental is at infant stage.
- Ignorance and incomplete knowledge has lead to misconceptions
- Development and improvement in std. 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).

- Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, (2006).

**REFERENCES:**

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

**FT6302**

**GARMENT CONSTRUCTION**

**LT P C**

**3 0 0 3**

**OBJECTIVES:**

To develop knowledge of apparel construction processes

**UNIT I LAYING 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 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**

**9**

The properties of seams, seam types and classes, Stitch types and classes, machine elements in sewing, sewing threads and their basic requirements in sewing, problems in sewing, quality of sewing and standards.

**UNIT III GARMENT COMPONENTS AND FUNCTIONAL PURPOSES**

**9**

Ladies and men's tops -basic blocks, collars, sleeves, cuffs, pleats, gatherings and darts, skirts. Ladies and men's bottoms, trousers basic blocks, pockets, welts, yolk. The purpose of darts pleats and panels. Children's dresses, innerwear and lingerie. Balance and symmetry in garment construction. Wash finishing and packing.

**UNIT IV STYLES AND OPERATION BREAK DOWN**

**9**

Operations break down for shirts, trousers, blouses, jackets, dresses. Material flow, cut component progresses, tracking and machinery allocation, labour allocation and skill levels.

**UNIT V PRODUCTION PROCESSES**

**9**

Line set up, production line balancing, different production system, manual system, make through system, batch production system , progressive bundle system, straight line system, progressive bundle system, conveyor belt system , unit production system , modular production system, quick response system and Just in time system.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

Upon completion of the course, the student would have

- Overview of the manufacturing process and the industrial equipment used in garment construction.
- Sound knowledge of apparel pre-processing
- Understood different apparel production systems

**TEXTBOOKS:**

- Jacob Solinger, "Apparel Production Handbook", Reinhold Publications, 1998
- Carr H and Latham B., "The Technology of Clothing Manufacturing", Blackwell Science, U.K., 1994
- Ruth E. Glock, Grace I. Kunz, "Apparel Manufacturing, Sewn Product Analysis", fourth edition, Pearson Education.

**REFERENCES:**

1. Laing R.M., Webster J, "Stitches & Seams", The Textile Institute, India,1998
2. Shaeffer Claire, "Sewing for the Apparel Industry", Prentice Hall, New Jersey, 2001
3. Singer, "Sewing Lingerie", Cy De Cosse Incorporated, 1991
4. Patty Brown & Janett Rice, "Ready-To-Wear Apparel Analysis", Third Edition, Prentice-Hall Inc., New Jersey.

**FT6303****FASHION EVOLUTION****LT P C  
3 0 0 3****OBJECTIVE:**

- To acquaint the student with the history of fashion, its elements, traditional costumes, accessories and embellishments.

**UNIT I****12**

History of fashion – Elements of Fashion. Fashion cycles – length of cycles. The psychology of clothing – factors influencing fashion. Adoption of fashion – traditional- modern, Fashion categories.

**UNIT II****12**

Indian garments from ancient to modern times. Traditional Indian textiles – Motifs, colour combinations, designs. Accessories and embellishments.

**UNIT III****12**

History of western costumes. Greek and Persian influence on fashion. English, American and French costumes. Silhouette, Headgears, Clothing styles and embellishments.

**UNIT IV****9**

African and European traditional costumes, colour combination, designs, motifs and accessories.

**UNIT V****9**

Traditional costumes of Asian countries – Japan, China, Srilanka, Pakistan, Afghanistan and Thailand.

**TOTAL: 45 PERIODS****OUTCOME:**

Upon completion of the course, the student would develop an understanding of fashion evolution and fashion designing

**TEXTBOOKS:**

1. Vandana Bhenderi, "Costume, Textiles and Jewellery of India – Traditions in Rajasthan", Prakash Books, New Delhi, 2004.
2. Fillow J and Bernard N Thomas and Hudson, "Traditional Indian Textiles", Prentice Hall, India, 1993.

**REFERENCES:**

1. Hart A North S V and A Museum, "Historical Fashion in detail the 17th and 18th Centuries", McMillan, India, 1998.
2. Kathy Alert,"Traditional folk costumes of Europe paper dolls in full color", Dover publications, Inc., Newyork,1984.

**OBJECTIVE**

To train the students in fashion illustration

**LIST OF EXPERIMENTS**

1. Drawing still objects.
2. Sketching Human body.
3. Sketching of Ideal figure –Men and Women.
4. Creating garment designs.
5. Proportions and style lines illustrations.

**TOTAL : 45 PERIODS**

**OUTCOMES:**

Upon completion of this practical course, the student would be able to sketch human body, ideal figures and create garment designs.

**LIST OF EQUIPMENT REQUIRED FOR 30 STUDENTS**

- Drawing tables - 30 No.

**OBJECTIVE:**

To train the students on identification of different kinds of fibres based on different tests and measurement of properties of fibres.

**LIST OF EXPERIMENTS**

1. Identification of fibres by feel, microscopic view, burning behaviour and solubility
  - a. Natural cellulose fibres
  - b. Natural protein fibres
  - c. Regenerated cellulose fibres
  - d. Polyamide fibres
  - e. Polyester fibres
  - f. Polyolefin fibres
2. Determination of density of various fibres by density gradient column
3. Determination of denier of synthetic fibres by gravimetric method
4. Determination of Moisture Regain and Moisture content of fibres
5. Determination of the percentage of spin finish of synthetic fibres
6. Determination of wax content of the cotton fibres
7. Determination of the blend proportion
  - a. Natural/ regenerated cellulose
  - b. Cellulose/ protein fibres
  - c. Cellulose/polyester fibres
  - d. Natural cellulose/ regenerated cellulose/polyester
8. Thermo gravimetric analysis of fibres
9. FTIR analysis of polymers and fibres
10. Determination of count of yarn and CV %
11. Determination of yarn Strength (Lea strength) CV% and CSP
12. Determination of yarn Appearance – Grades.
13. Determination of yarn evenness and Imperfections
14. Determination of single yarn Twist and CV%
15. Determination of crimp in Yarn

**TOTAL: 45 PERIODS**

**OUTCOMES:**

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

- Identify the given fibres using cross section, dissolution in solvent and burn test practically.

- Determine important properties of fibres
- Determine blend proportion of different fibres in a blended material

### LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS

1. Microscope – 1 No.
2. Density gradient column-1 No.
3. Weighing balance – 1 No.
4. Conditioning Oven – 1No.
5. Spin finish tester – 1 No.
6. Thermogravimetric analyzer -1 No.
7. FTIR Spectrometer -1 No.

**GE6562**

**EMPLOYABILITY SKILLS**

**L T P C**  
**0 0 2 1**

#### OBJECTIVES:

- To enhance the employability skills of learners with a special focus on presentation skills, group discussion and interview skills.
- To enable them to improve their soft skills necessary for workplace contexts.
- To equip them with effective communicative competence for a global reach.

#### UNIT I SPEAKING SKILLS

**6**

Conversational skills (formal and informal contexts) - telephonic communication, attending job interviews (responding to FAQs) - taking part in GDs - making presentations.

#### UNIT II WRITING SKILLS

**6**

Job applications – cover letter – resume – applying online – writing proposals – emails – letters – reports – memos – minutes – blogging – tweeting – writing recommendations and instructions – writing for publications.

#### UNIT III READING SKILLS

**6**

Vocabulary building – speed reading (skimming – scanning) – reading different genres of texts from newspapers to philosophical treatises – critical reading – effective reading strategies such as reading ‘beyond the lines’, summarizing, graphic organizers and distinguishing facts from opinions.

#### UNIT IV LISTENING/VIEWING SKILLS

**6**

Speeches of different nationalities with focus on American and British accent (TED talks, podcasts) – listening to lyrics – lectures – instructions – dialogues – news casting – talk shows – interviews (Hard talk, Devil's Advocate)

#### UNIT V SOFT SKILLS

**6**

Motivation - persuasive skills – negotiations – time management – emotional intelligence – stress management – creative and critical thinking.

**TOTAL : 30 PERIODS**

#### TEACHING METHODS:

1. To be totally learner-centric with minimum teacher intervention as the course revolves around practice.
2. Suitable audio/video samples from Podcast/YouTube to be used for illustrative purposes.
3. Portfolio approach for writing to be followed. Learners are to be encouraged to blog, tweet, text and email employing appropriate language.
4. GD/Interview/Role Play/Debate could be conducted off the laboratory (in a regular classroom) but learners are to be exposed to telephonic interview and video conferencing.
5. Learners are to be assigned to read/write/listen/view materials outside the classroom as well for gaining proficiency and better participation in the class.
- 6.

### Lab Infrastructure:

Sl. No	Description of Equipment (Minimum Configuration)	Qty Required
1	<b>Server</b>	1 No.
	PIV System	
	1 GB RAM / 40 GB HDD	
	OS: Win 2000 server	
	Audio card with headphones	
	JRE 1.3	
2	<b>Client Systems</b>	60 Nos.
	PIII System	
	256 or 512 MB RAM / 40 GB HDD	
	OS: Win 2000	
	Audio card with headphones	
	JRE 1.3	
3	Handicam	1 No.
4	Television 46"	1 No.
5	Collar mike	1 No.
6	Cordless mike	1 No.
7	Audio Mixer	1 No.
8	DVD recorder/player	1 No.
9	LCD Projector with MP3/CD/DVD provision for Audio/video facility	1 No.

#### Evaluation:

##### Internal: 20 marks

Record maintenance: Students should write a report on a regular basis on the activities conducted, focusing on the details such as the description of the activity, ideas emerged, learning outcomes and so on. At the end of the semester records can be evaluated out of 20 marks.

##### External: 80 marks

Online Test	- 35 marks
Interview	- 15 marks
Presentation	- 15 marks
Group Discussion	- 15 marks

#### NOTE FOR THE INTERNAL ASSESSMENT:

1. Interview – mock interview can be conducted on one-on-one basis.
2. Speaking – example for role play:
  - a. Marketing engineer convincing a customer to buy his product.
  - b. Telephonic conversation- fixing an official appointment/placing an order/enquiring and so on.
3. Presentation – should be extempore on simple topics
4. Discussion – topics of different kinds; general topics, case studies and abstract concept

#### OUTCOMES:

##### At the end of the course learners should be able to

- Participate in conversations both formal and informal, attend phone calls and interviews successfully.
- Read different types of texts.
- Listen to, and understand foreign accents.

#### REFERENCES:

1. Barker, A. **Improve Your Communication Skills**. New Delhi: Kogan Page India Pvt. Ltd., 2006.
2. Craven, Miles. **Listening Extra – A resource book of multi-level skills activities**. Cambridge University Press, 2004.

3. Gammidge, Mick. **Speaking Extra - A resource book of multi-level skills activities.** Cambridge University Press, 2004.
4. Hartley, Peter. **Group Communication.** London: Routledge, 2004.
5. John Seely. **The Oxford Guide to Writing and Speaking.** New Delhi: Oxford University Press, 2004.
6. Naterop Jean & Rod Revell. **Telephoning in English.** Cambridge University Press, 1987.
7. Ramesh, Gopalswamy and Mahadevan Ramesh. **The ACE of Soft Skills.** New Delhi: Pearson, 2010.

**Web Sources:**

1. [www.humanresources.about.com](http://www.humanresources.about.com)
2. [www.careerride.com](http://www.careerride.com)

**FT6401**

**PATTERN ENGINEERING I**

**LT P C  
3 0 0 3**

**OBJECTIVE:**

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

**UNIT I BASICS OF ANTHROPOMETRICS AND SIZING SYSTEMS 12**

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.

**UNIT II STUDY OF BODY MEASUREMENTS 6**

Important body measurements across all age groups, Methods of measuring body dimensions, Standard measurement chart-designation and control dimensions.

**UNIT III RUDIMENTS TO PATTERN MAKING 9**

Functions of pattern making tools, Preparing and Measuring the Form, Trueing, blending, pattern grain line, balance line terms, notches, seam allowance, jog seam, dart points, pleats, flares, gather and true bias.

**UNIT IV BASIC PATTERN SET 9**

Pattern making - Drafting and draping methods. Basic men's and women's block.

**UNIT V PATTERN MAKING - PRINCIPLES 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**

**OUTCOME:**

The course would help the students to develop better understanding on how clothing should be designed, so as to provide not only good fit but also enhance body image

**TEXTBOOKS:**

1. Fan J, Yu W, and Hunter L., "Clothing Appearance and Fit: Science and Technology", Wood head Publishing Limited, 2004
2. Ashdown S. P., "Sizing in Clothing", Wood head Publishing Limited, 2007
3. Helen Joseph, Armstrong, "Patternmaking for Fashion Design", Pearson Education Pte. Ltd., 2005

**REFERENCE:**

1. Winifred Aldrich, "Metric Pattern Cutting for Children's Wear and Baby Wear", Blackwell Publishing, 2004



**OBJECTIVE:**

- To acquaint students of the different trims, components, accessories and embellishments used as fashion accessories
- To make them acquire skills essential to evaluate the performance of accessories

**UNIT I****9**

Garment components and trimmings – 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, rivets and other closures. Decorative and functional trimmings – Applique, sequins, beadwork, smocking, and other surface ornamentation – performance, properties, types and application techniques on fabrics and garments.

**UNIT II****9**

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****9**

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; kaustic embroidery; kasida, kathiwar; Sind; chickankari; zardosai; tribal embroideries.

**UNIT IV****9**

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

**UNIT V****9**

Printing – introduction; different methods – block printing, roller, screen, discharge, resist and pigment; styles of printing - batik, tie and dye, patch work, appliqué work, bead work.

**TOTAL : 45 PERIODS****OUTCOMES:**

Upon completion of the course, the students would be able

- To develop a thorough understanding of the different accessories and embellishments their performance, properties and application
- To independently hint accessories apt for different garment styles

**TEXTBOOK:**

1. Shailaja D. Naik, "Traditional Embroideries of India", API Publishing Corporation, New Delhi, 1996

**REFERENCE:**

1. Shella Paine, "Embroidered Textiles", Thames and Hudson Ltd., U. S. A., 1990

**OBJECTIVE:**

- To acquaint students of the basic production machinery and equipments used in apparel construction

**UNIT I FABRIC INSPECTION AND SPREADING MACHINES 9**

Fabric inspection devices – manual and automatic – modes of fabric feeding, fabric tension controller and modern developments; Spreading machines – manual, semi automatic and fully automatic machines, fabric control devices in spreading machines

**UNIT II CUTTING MACHINES 9**

Mechanism of straight knife cutting machines, rotary cutting machines, band knife cutting machines, die cutting, laser cutting, plasma cutting, water jet cutting and ultra sonic cutting; Notches, drills and thread markers; Computer interfaced cutting machines.

**UNIT III SEWING MACHINES 9**

Sewing machines – primary and secondary components; Working principle, stitch formation and timing diagram - lock stitch and chain stitch; single needle and double needle lock stitch mechanism: needle bar, hook – rotary and feed mechanism; Needles – geometry, types and selection

**UNIT IV SPECIAL SEWING MACHINES 9**

Over lock, Flatlock, Feed off arm, button fixing and button holing; Embroidery machines – mechanism and stitch formation; Sewing machines feed mechanisms; sewing machine attachments

**UNIT V FINISHING MACHINES 9**

Molding machineries; Shrinking machineries – London shrinking, hot-water shrinking, steam sharking and compaction shrinkage; Pressing machineries – buck pressing, iron pressing, block or die pressing, form pressing, steamers and advanced pressing machineries; Pleating – principles and mechanics machineries.

**TOTAL : 45 PERIODS**

**OUTCOME:**

Upon completion of the course, the students would understand the fundamental principles and working of garment production machinery and the interrelationship of assembly methods

**TEXTBOOKS:**

1. Harold Carr & Barbara Iatham, "The Technology of Clothing Manufacture", Black well Sciences, 1996
2. Jacob Solinger., " Apparel Manufacturing Handbook ", VanNostrand Reinhold Company, 1980

**REFERENCE:**

1. Ruth E. Glock and Grace I. Kunz, "Apparel Manufacturing Sewn Product Analysis" , Pearson Prentice Hall, 2005

**TT6402**

**FABRIC STRUCTURE**

**LT P C  
3 0 0 3**

**OBJECTIVE:**

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

**UNIT I 9**

Elementary weaves – plain and its derivatives, twill and its derivatives, 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

<b>UNIT III</b>	<b>13</b>
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	
<b>UNIT IV</b>	<b>9</b>
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	
<b>UNIT V</b>	<b>5</b>
Double cloth, types of stitches; Damasks; Gauze and Leno principles – loom requirements, 3D fabrics	

**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

**TEXTBOOKS:**

1. Grosicki Z. J., "Watson's Textile Design and Colour", Vol.1, Woodhead Publications, Cambridge England, 2004
2. Grosicki Z. J., "Watson's Advanced Textile Design and Colour", Vol.II, Butterworths, London, 1989

**REFERENCES:**

1. Grosicki Z. J., "Watson's Textile Design and Colour", Vol.1, Woodhead Publications, Cambridge England, 2004
2. Grosicki Z. J., "Watson's Advanced Textile Design and Colour", Vol.II, Butterworths, London, 1989
3. Wilson J., "Handbook of Textile Design", Textile Institute, Manchester, 2001
4. Horne C.E., "Geometric Symmetry in Patterns and Tilings", Textile Institute, Manchester, 2000.
5. Seyam A. M., "Structural Design of Woven Fabrics, Theory and Practice", Textile Institute, Manchester, 2002.
6. Georner D, "Woven Structure and Design, part 1: Single Cloth Construction", WIRA, U.K., 1986
7. Georner D, "Woven Structure and Design, Part 2: Compound Structures", WIRA, U.K.,1989

**FT6404**

**TEXTILE CHEMICAL PROCESSING I**

**L T P C  
3 0 0 3**

**OBJECTIVES:**

- To acquaint student of the operational sequence in wet processing of different textile materials
- To impart knowledge in the field of pre-processing, processing and post-processing of textile substrate
- To impart fundamental knowledge of colour science and assessment of dyed and printed goods

**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 dyeing 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:**

At the completion of the course, the student would be able to develop a thorough knowledge on

- Chemical processing of textile materials
- Dyeing and printing methods and principles of colour application
- Assessment of fastness properties of dyed and printed goods

**TEXTBOOKS:**

1. Trotman E. R., "Dyeing and Chemical Technology of Textile Fibres", B.I Publishing Pvt. Ltd., New Delhi, 1994
2. Shenai V. A., "Chemistry of Dyes and Principles of Dyeing", Sevak Publications, Mumbai, 1995
3. Shore J., "Colourants and Auxiliaries: Volume I Colorants", Wood head Publishing Ltd., 2002.
4. Shenai V. A., "Technology of Printing", Sevak Publications, Mumbai, 1996

**REFERENCES:**

1. Shore J., "Colourants and Auxiliaries: Volume II Auxiliaries", Wood head Publishin Ltd, 2002.
2. Cegerra J. Puente P. And Valladepears J., "The Dyeing of Textile Materials", Textile Institute, Manchester, 1993
3. Miles W. C., "Textile Printing", Wood head Publication, 2003.
4. Johnson A., "The Theory of Colouration of Textiles", SDC, Second edition, 1989.
5. Shah H. S. and Gandhi R. S., "Instrumental Colour Measurement and Computer Aided Colour Matching for Textiles", Mahajan Book Publication, 1990

**TC6405**

**TECHNOLOGY OF FABRIC MANUFACTURE**

**LT P C**

**3 1 0 4**

**OBJECTIVES:**

The main objective of this course is to enable the students to understand

- Preparatory processes involved in the production of fabric
- Basics of weaving and knitting processes
- Basics of nonwoven production methods

**UNIT I** **9** **PREPARATION OF YARNS FOR WEAVING AND KNITTING**

Objects of winding – Different types of winders – Parallel winding, cross winding and precision winding. Conventional and automatic winding machines. Yarn clearing and splicing – Types of tensioners, guides. Weft winding - Pirn winding: Types and working principle of pirn winding machines – bunching, stop motions – Features of automatic pirn winding machine. Warping - Beam warping machines – creels – features of modern warping machines - sectional warping machine. Types and selection of ingredients for sizing, Size recipe for various types of fabrics, Sizing machines – multi-cylinder & hot air sizing – Methods of drying– Modern development in Sizing, Single end sizing. Drawing-in and Denting.

**UNIT II PLAIN POWER LOOM 9**

Types of looms - Primary, secondary and auxiliary mechanisms of loom, - Classification of weaving machines. Shedding - Tappet shedding, Shuttle Picking mechanism – Beat-up mechanism. Stop motions – Friction Let – off motion - Negative let off and positive let off motions. Take-up motion - Five wheel take up motion, Seven wheel take up motion, Positive continuous take up motion. Warp protector Mechanisms - Loose Reed and Fast Reed Mechanisms, Warp Stop Motions, Weft stop motions, temples, lease rods and brake. Weaving faults. Brief study about drop box loom and Terry loom.

**UNIT III DOBBY AND JACQUARD SHEDDING 9**

Principles of working of single lift and double lift dobbies. Methods of pegging. Negative and positive dobbies. Cross boarder, paper, cam and rotary dobbies. Single lift and double lift Jacquards. Open shed jacquards. Electronic jacquards.

**UNIT IV SHUTTLELESS WEAVING 9**

Yarn quality requirements for Shuttleless looms, Principles of weft insertion in shuttleless loom - Mechanisms of weft insertion by Projectile, Ravier, Airjet and Waterjet looms - Techno economics of shuttleless weaving. Defects in woven fabrics – causes and remedies.

**UNIT V BONDED FABRICS & KNITTING 9**

Types of bonded fabrics. Web preparation for bonding – Different type of Bonding – Mechanical, Thermal and Chemical. End uses of bonded fabrics. Knitting – weft and warp knitting. Knitted fabric properties.

**TOTAL (L : 45 + T : 15) : 60 PERIODS**

**OUTCOMES:**

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

- Explain the preparatory processes involved in the production of fabrics
- Explain the principles of different fabric production methods
- Identify various fabric defects and their causes and remedies

**TEXT BOOKS:**

1. Sriramulu P.K., Ajgaonkar D.B. & Talukdar M.K., Weaving Machines: Mechanisms, Management, Mahajan Publishers, Ahmedabad, 1998.
2. Lord P.R. and Mohammed M.H., Weaving – Conversion of Yarn to Fabric, Merrow Publication, 1992.

**REFERENCES:**

1. Modi J.R.D., Sizing Ingredient, Mahajan Publications, Ahmedabad
2. Ormerod A., Modern Preparation and Weaving, Merrow Publication Co. U.K. 1988.
3. Talukdar M.K., “An Introduction to Winding and Warping” Testing Trade Press, Mumbai.
4. Talavasek O. & Svaty V., Shuttleless Weaving Machines, Elsevier Scientific Pub. Co., New York 1981.
5. Adanur S., Handbook of Weaving, Technomic Publishing Co., Inc., 2001.

**TT6461**

**FABRIC STRUCTURE LABORATORY**

**L T P C  
0 0 3 2**

**OBJECTIVE:**

To train the students in analyzing the cloth to identify construction parameters and prepare design, draft and peg plan.

**LIST OF EXPERIMENTS**

Analysis of construction details of the following fabric structure

1. Plain and its derivatives
2. Twill and its derivatives
3. Satin (Regular and irregular)
4. Sateen (Regular and irregular)

5. Honeycomb (ordinary and Brighton)
6. Huck-a-back
7. Extra warp and extra weft figuring
8. Pile fabrics (warp and weft)
9. Backed fabrics
10. Gauze and Leno
11. Double cloth
12. Crepe
13. Tapestry
14. Mock-leno
15. Bedford cord.
16. Single jersey
17. Double jersey structures
18. Analysis of blend composition in the yarn of the fabric
19. Analysis of finish on the fabric

**TOTAL : 45 PERIODS**

**OUTCOMES:**

Upon completion of the lab the student will be able

- Identify the constructional parameters of fabric
- Construct design, draft and peg plan for weaving the fabric
- Analyse the blend composition of yarn used in the fabric and the type of finish applied in the fabric

**LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS**

1. Counting Glass – 30 No.
2. GSM Cutter – 1 No.
3. Beesley Balance – 1 No.
4. Crimp Tester – 1 No.
5. Electronic balance – 1 No.

**FT6411**

**PATTERN ENGINEERING LABORATORY – I**

**L T P C  
0 0 3 2**

**OBJECTIVE:**

To train the students in pattern making of apparels.

**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. Single dart series slash spread technique
5. Single dart series pivotal transfer technique
6. Double dart series slash spread technique
7. Double dart series pivotal transfer technique.
8. Graduated and radiating darts.
9. Pleat tuck and pin tuck.

**TOTAL : 45 PERIODS**

**OUTCOME:**

Upon completion of this practical course, the student would have practical experience on pattern making of garments

**LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS**

- Working surface – pattern making / cutting table (polished or laminated top)
- Fabric and paper scissors - 15 No.
- Rulers – 12” and 36” - 15 No.

- Tailor's square – 24" x 14" - 15 No.
- Curve rules – French curves, hip curves and vary form curve - 15 No.
- Pattern notcher, tracing wheel, awl - 5 No.
- Measuring tape - 30 No.
- Pattern weights - 10 No.
- Dress forms (Full and Half) – Kids, Children's, Women's and Men's - 3 Each

**FT6412**

**GARMENT CONSTRUCTION LABORATORY - I**

**L T P C  
0 0 3 2**

**OBJECTIVE:**

To train the students in construction of garments

**LIST OF EXPERIMENTS**

1. Stitch classification and stitch properties.
2. Formation of Stitch classes.
3. Seam classification and common uses.
4. Sewing practice of – superimposed seam, lapped seam, bound seam and flat seam.
5. Button hole and button stitch machine.
6. Study of Feed-of-the-arm machine.
7. Assembling of various garment components using appropriate seams.

**TOTAL : 45 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.

**LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS**

- High speed industrial sewing machines
  - Single needle lock stitch machine - 30 No.
  - Double needle lock stitch machine - 02 No.
  - Over-lock machine - 02 No.
  - Feed-of-the-arm machine - 01 No.
  - Button stitch machine - 01 No.
  - Button hole machine - 01 No.
  - Flat lock machine - 01 No.
  - Zigzag machine - 01 No.
- Straight knife cutting machine - 01 No.
- Steam pressing table (Desirable) - 01 No.
- Iron box (electric) - 04 NO.

**FT6501**

**TEXTILE CHEMICAL PROCESSING - II**

**L T P C  
3 0 0 3**

**OBJECTIVES:**

- To acquaint student with different types of textile finishing and its assessment
- Have knowledge of garment dyeing, printing and washing
- Have knowledge of dyes, auxiliaries and eco friendly chemical processes





Cutting and weighing methods – Electronic capacitance – Uster evenness tester – Uster standards – Yarn faults – classification – Uster Classimat.

**UNIT III FABRIC TESTING 9**

Crimp – Influence on fabric properties – Shirley crimp tester, fabric tensile strength tester – ravelled strip method – grab methods. Elmendorf tear tester, Ballistic tester – Hydraulic bursting strength tester, Fabric abrasion resistance – handle- serviceability assessment, Martindale abrasion tester, Fabric pilling I.C.I Pillbox tester.

**UNIT IV DRAPE MEASUREMENT 9**

Fabrics drape measurement – Drape meter. Fabrics stiffness - Shirley stiffness tester, fabric crease resistance and crease recovery measurements. Fabric permeability - Shirley air permeability tester – Fabric water permeability tester – Friction measuring instruments.

**UNIT V APPAREL TESTING 9**

Seam strength testing – Seam severance testing. Evaluation of interlinings quality Colour fastness testing Apparel dimensional stability testing. Objective evaluation of fabric tailorability.

**TOTAL : 45 PERIODS**

**OUTCOMES:**

The student will have knowledge on

- Methods by which the physical and mechanical properties of textile materials and products are measured and investigated
- Sampling and yarn quality parameters testing
- Fabric and garment quality parameters testing

**TEXTBOOKS:**

1. Booth J.E., "Principle of Textile Testing", Butterworth Publications, London, 1989
2. Kothari V. K., "Testing and Quality Management", Progress in Textile Technology Vol.1, IAFL Publications, New Delhi, 1999
3. Sara J. Kadolph., "Quality Assurance for Textiles and Apparels", Fair Child Publications, New York, 1998

**REFERENCES:**

1. Saville, B.P. "Physical Testing of Textiles", Woodhead Publishing Ltd., England, 2004.
2. Grover E G and Hamby D. S "Hand Book of Textile testing and quality Control", Wiley Eastern Pvt. Ltd., New Delhi, 1969.
3. Ruth clock and Grace Kunz., "Apparel Manufacture – Sewn Product Analysis", Upper Sadle River Publications, New York, 2000
4. Pradip V. Mehta., "Managing Quality in the Apparel Industry", NIFT Publication, India, 1998
5. Slater K., "Physical Testing and Quality Control", The Textile Institute, Vol.23, No.1/2/3 Manchester, 1993
6. Arindam Basu, "Textile Testing-Fiber, Yarn & Fabric", SITRA, India, 2001.

**TT6503**

**KNITTING TECHNOLOGY**

**L T P C  
3 0 0 3**

**OBJECTIVES:**

To make the students to understand

- Fundamentals of knitting
- Types of knitting processes in detail
- Functioning of components of knitting machine

**UNIT I INTRODUCTION 9**

Reasons for the growth of the knitting industry. Comparisons of fabric properties - wovens, knits and bonded fabrics; classification of knitting processes – weft and warp knitting; yarn quality requirements for knitting. Preparation of staple yarns for weft and warp knitting.

**UNIT II FUNDAMENTALS OF KNITTING 9**  
General definitions and principles of knitting; Types of knitting needles – bearded, latch & compound needle. Elements of knitted loop structure.

**UNIT III WEFT KNITTING 9**  
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. Weft knitted fabric geometry.

**UNIT IV WEFT KNITTING MACHINES 9**  
Construction, Characteristics and working of circular knitting machines used for the production of basic structures; production of derivatives of weft knitted structures; needle control in circular knitting machines; quality control in knitted fabric production; production calculation. Basic principles and elements of flat knitting machines; different types of flat knitting machines - manual, mechanical and computer controlled; production of various weft knitted structures using flat knitting machines.

**UNIT V WARP KNITTING 9**  
Basic principles; elements of warp knitted loop – open loop, closed loop; warp knitting elements-chain link, chain links for simple patterns, guide bar movement mechanism,. Tricot and Rachel warp knitting machines. Principles of double needle bar patterning, Terry pile fabric production. Let off system; run in value based on the lapping diagram; take up system; theoretical concepts of warp knitted loop configuration; Uses of warp knitted fabrics in technical applications.

**TOTAL : 45 PERIODS**

**OUTCOMES:**

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

- Principle of knitting by different types of knitting machines
- Structure and properties of fabric produced by different knitting machines

**TEXTBOOKS:**

1. Spencer D.J., “Knitting Technology”, III Ed., Textile Institute, Manchester, 2001.
2. Ajgaonkar D.B., “Knitting Technology”, Universal Publishing Corporation, Mumbai, 1998.

**REFERENCES:**

1. Chandrasekhar Iyer, Bernd Mammel and Wolfgang Schach., “Circular Knitting”, Meisenbach GmbH, Bamberg, 1995.
2. Samuel Raz., “Flat Knitting: The new generation”, Meisenbach GmbH, Bamberg, 1997.
3. Samuel Raz., “Warp Knitting production”, Melliand Textilberichte, GmbH, Rohrbacher, 1987.
4. Gajjap B.J., “Handbook of warp Knitting Technology”, Textile Institute, Manchester, 2004.
5. Thomas D.G.B., “An Introduction to Warp Knitting”, Mellow Publishing Company, UK., 1971.
6. Sam Raz, “Warp Knitting Production”, Melliand Textilberichte GmbH, Heidelberg, Germany, 1987.
7. Die Maschenbindungen der Kettenwirkerai, “An Introduction to the Stitch Formations in Warp Knitting”, Published Employee’s Association, Karl Mayere.V., Germany, 1966
8. Paling D.F., “Warp Knitting Technology”, Columbine Press, U.K, 1966
9. Charles Reichman, “Wool and Synthetic Knitwear Handbook”, National Knitted Outerwear Association, U.S.A, 1967
10. Charles Reichman, “Knitted Stretch Technology”, National Knitted Outerwear Association, U.S.A, 1965

**OBJECTIVES:**

To educate the students in techniques and machinery for dyeing and finishing of garments and to impart knowledge on different garment care techniques.

**UNIT I****9**

Water –soft water –hard water – methods of softening water. Garment dyeing, dye selection, garment-dyeing machinery. Washing: Stone washing, acid washing, enzyme washing, bio polishing, mesmerisation, bleaching, laser fading and ozone fading.

**UNIT II****9**

Study of laundry equipment and reagents – soaps – detergents – cleaning action of soaps, study of modern and industrial cleaning agents. Finishing; Optical brightening, mercerization, liquid ammonia, treatment, stiffening, softening, crease resistant and crease retentive finish, anti-static finish, anti-bacterial finish, water proofing, flame proofing, soil release finish, mildew and moth proofing.

**UNIT III****9**

Study of garment finishing room equipments – steam iron – steam busters – vacuum ironing tables – form finishing equipments – trouser toppler, shirt press, collar/cuff press, form finisher for jackets and coats – study of boiler and related equipment for finishing room. Fusing machines for interlinings

**UNIT IV****9**

Principles of laundering – stain removal – various solvents for stain removing blood, tea, rust, oil/grease etc. – different methods of washing – application of friction by hand rubbing – scribing – tumble wash

**UNIT V****9**

Stain removal – Oil, colour matter, chemicals. Use of care labels and standards / norms for care labels. Garment laundering equipments and procedures. Study of different types of house hold/industrial washing machines- rotary –swirling – pressure – tumble wash etc

**TOTAL: 45 PERIODS****OUTCOMES:**

The students would have knowledge on

- Dyeing techniques for apparel
- Applying of different finishes on garments
- Machinery and equipments for garment care

**TEXT BOOKS:**

1. Dantiyagi S., "Fundamentals of Textile and their care", Oriental longmans Ltd, New Delhi, 1980.
2. Denlkar, "Household Textiles & laundry work", Atma Ram & Sons, Delhi, 1993.
3. Harrison. P (Editor), "Garment Dyeing: Ready to wear fashion from the dye house", The Textile Institute, U.K. 1988.
4. Noemia D' Souza., "Fabric Care", New Age International (P) Ltd. Publisher, Chennai, 1998.

**REFERENCES:**

1. Marsh, J.T., "An Introduction to Textile Finishing", Chapman and Hall Ltd., London, 1979.
2. Shenai, V.A., "Technology of Textile Finishing", Sevak Publications, Bombay, 1995.
3. Hall, A.J., "Textile Finishing" Elsevier Publishing Co. Ltd., 1986.

**OBJECTIVES:**

- 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 area, operation wise machinery allocation, usage of special attachments and tools for operation simplifications, production grid and flow chart.

**UNIT III****9**

Cutting techniques, cutting room controls, lay lot planning, bundle distributions, modern methods in cut piece distribution and tracking different manufacturing systems, mass customisation and made to order manufacturing systems advantages disadvantages and control measures in sewing.

**UNIT IV****9**

Production planning -Production floor balancing, 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 product development, quality control in printing, embroidery, washing and other accessories, quality planning, preproduction meetings and quality procedures, production meetings, in line inspection, final inspection, rescreening conditions and final inspections. Packing - Ratio packing, solid packing, short shipment, excess shipment, calculation of volumetric weight, carton dimension other requirements.

**TOTAL : 45 PERIODS****OUTCOME:**

The course will enable students to practise better methods in apparel production and planning to take informed business decisions in the apparel industry

**TEXTBOOKS:**

1. Jacob Solinger, "Apparel Production Handbook", Reinhold Publications, 1998
2. Carr H and Latham B., "The Technology of Clothing Manufacturing", Blackwell Science, U.K.,1994
3. Ruth E. Glock, Grace I. Kunz, "Apparel Manufacturing, Sewn Product Analysis", Fourth Edition, Pearson Education.
4. Chuter A.J., "Introduction to Clothing Production Management", Blackwell Scientific Publications, Oxford 2001.

**REFERENCES:**

1. Laing R.M., Webster J, "Stitches & Seams", The Textile Institute, India, 1998
2. Shaeffer Claire, "Sewing for the Apparel Industry", Prentice Hall, New Jersey, 2001
3. Singer, "Sewing Lingerie", Cy DeCosse Incorporated, 1991
4. Patty Brown & Janett Rice, "Ready-To-Wear Apparel Analysis", Third Edition, Prientice- Hall Inc., New Jersey.



3. Gored, flared skirts, Jeans, jumpsuits
4. Sleeve's, collar (convertible, peter-pan collar, turtle neck collar, shawl collar).
5. Neckline cowl, side seam cowl, bias cowl.

**TOTAL : 45 PERIODS**

**OUTCOMES:**

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

- Develop patterns for women's, men's and children's garments
- Do grading of patterns
- Develop patterns for basic bodice, gored, flared skirts, jeans and jumpsuits

**LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS**

- Working surface – pattern making / cutting table (polished or laminated top)
- Fabric and paper scissors - 15 No.
- Rulers – 12" and 36" - 15 No.
- Tailor's square – 24" x 14" - 15 No.
- Curve rules – French curves, hip curves and vary form curve - 15 No.
- Pattern notcher, tracing wheel, awl - 5 No.
- Measuring tape - 30 No.
- Pattern weights - 10 No.
- Dress forms (Full and Half) – Kids, Children's, Women's and Men's - 3 Each

**FT6512**

**TEXTILE CHEMICAL PROCESSING LABORATORY**

**L T P C  
0 0 3 2**

**OBJECTIVE:**

To train the students in pre treatment and wet processing of textile materials

**LIST OF EXPERIMENTS**

1. Desizing and scouring of cotton 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 : 45 PERIODS**

**OUTCOME:**

Upon completing this practical course, the student would be able to desize, bleach, dye, print and finish the fabric with different types of chemicals and colourants

**LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS**

1. Stainless vats (500 ml)
2. Water bath, Thermometers
3. Stirrer
4. Steam ager
5. Pilot padding mangle
6. HTHP Beaker dyeing machine

7. Pilot curing chamber
8. Fastness tester for Washing, Light, Perspiration & Rubbing
9. Printing table
10. Spectrophotometer

FT6513

TEXTILE AND GARMENT TESTING LABORATORY

LT P C  
0 0 3 2

**OBJECTIVE:**

To impart knowledge of fabric and garment quality parameters testing.

**LIST OF EXPERIMENTS**

Determination of

1. Fabric tensile, tear and bursting strength
2. Fabric flexural rigidity, bending modulus and drapability
3. Fabric crease and wrinkle recovery
4. Fabric abrasion and pilling resistance tests
5. Fabric air permeability
6. Fabric surface roughness and friction coefficient
7. Determination of seam strength and seam slippage
8. Determination of fabric shrinkage, washing and crocking fastness (knitted and woven)
9. Kawabata – fabric low stress mechanical properties
10. Zipper endurance, slider pull-off strength tests

**TOTAL : 45 PERIODS**

**OUTCOMES:**

Upon completion the students will be able to

- Measure important characteristics of fabric and garment
- Interpret the results obtained during evaluation of fabrics

**LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS**

Equipments	No.
Fabric tensile strength tester	1
Fabric tearing strength tester	1
Fabric Thickness Tester	1
Fabric Stiffness Tester	1
Fabric Crease Recovery Tester	1
Fabric Bursting Strength Tester	1
Fabric Abrasion Resistance Tester	1
Fabric Pilling resistance tester	1
Wrinkle recovery tester	1
Fabric Crock meter	1
Fabric air permeability tester	1
Weighing balance	1
Fabric Drape meter	1
Kawabata Tester (Desirable)	1

**OBJECTIVE:**

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**

Thermo physiological comfort – thermoregulatory Mechanisms of the Human Body, role of clothing on thermal regulations

**UNIT III****9**

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

**UNIT IV****9**

Psychological comfort; neuro physiological comfort - basis of Sensory Perceptions, measurement techniques - Mechanical Stimuli and thermal stimuli.

**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.

**TEXTBOOKS:**

1. Hassan M. Behery, "Effect of Mechanical and Physical Properties on Fabric Hand", Wood head Publishing Ltd.,
2. Y. Li, "The Science of Clothing Comfort", Textile Progress 31:1

**REFERENCE:**

1. R.M.Laing, G.G. Sleivert, "Clothing, Textile and Human Performance, Textile Progress, 32:2

**OBJECTIVE:**

- To facilitate the understanding of structure and formation of speciality textile materials

**UNIT I****9**

Scope of speciality fabrics-fibres, yarns and fabrics. Structure and formation of fancy, core and coloured yarns.

**UNIT II****9**

Tape looms, needle looms, crochet and knitting machines for manufacture of narrow width products; tapes, ribbon, elastic, laces, woven labels – its production techniques, properties and applications.



**UNIT III** **12**  
 Weft knitted structures - Blister jacquard, plush, pile, velour and fleecy fabrics. Directionally oriented warp knitted structures. Classification of braided structure, production techniques, properties and applications.

**UNIT IV** **9**  
 Lining and interlining, fusible and non-fusible interlining-functional requirements-factors influencing fusing-material and machine parameters. Fusing methods-quality assurance in fusing.

**UNIT V** **6**  
 Coating – requirements – scope - application methods.

**TOTAL : 45 PERIODS**

**OUTCOMES:**

This course enables

- To acquaint student with the scope of speciality fabrics and its application
- The student understand the production techniques used in the manufacture of speciality fabrics
- To provide an advanced text for engineering and technology students, to bridge the gap between graduate studies and practical work operations for design and subsequent profitable operation of advanced textile mill catering to speciality fabrics

**TEXTBOOKS:**

1. Sabit Adanur, “ Wellington Sears Handbook of Industrial Textiles”, Technomic publishing company Inc.,USA, 1995.
2. Horrocks.. A. R & Anand..S. C, “ Handbook of Technical Textiles” ,Woodhead Publishing and Textile Institute, UK, 2000.
3. Russel.S, “Handbook of Nonwovens”, The Textile Institute Publication, Manchester, 2004.

**REFERENCES:**

1. Walter Fung,“Coated and Laminated Textiles”, Wood head publishing Limited, Cambridge, England, 2000.
2. McKenn H A, Hearle J W S and Hear NO, Handbook of fibre rope technology, Wood head publishing Limited, Cambridge, 2004.
3. Oxtoby E., “Spun Yarn Technology”, Butterworths, London, 2002.
4. Harold Carr and Barbara Latham,“The Technology of Clothing Manufacture”, Blackwell Science, Oxford, 2002.

**FT6603** **FASHION FORCASTING** **L T P C**  
**3 0 0 3**

**OBJECTIVE:**

To impart knowledge on principles marketing, marketing research. Domestic and international market.

**UNIT I** **9**  
 Fashion market and marketing environment – market research – evaluating the collections - Fashion consumer – Consumer influence on market.

**UNIT II** **9**  
 Fashion, Fad, style – Application – Society Fashion and individual fashion – their Coordination - wardrobe.

**UNIT III** **9**  
 Applied illusions – Physical effects- Overall height - over all weight – Covering body defects by design – Visual design in Dress in Australia - Brazil – Germany - India – Japan - Nigeria.

**UNIT IV** **9**  
 Fashion marketing research – Purpose of research - research design & data sources – Sampling methods – data Collection – Forecasting Fashion – Market Segmentation - marketing mix.

**UNIT V** **9**  
 Fashion Products and its importance – Fashion Industry & new Product Development – Fashion Designers role in apparel market – Branded Products – personal labels – stores that seek the merchandise.

**TOTAL : 45 PERIODS**

**OUTCOME:**

The students will have understanding on principles of marketing, factors affecting domestic and international market, fashion trends and consumer behaviour.

**TEXTBOOKS:**

1. Marian L. Davis, "Visual Design in Dress", Prentice Hall Inc., 1976.
2. Elaine Stone, "Fashion Merchandising", Blackwell Science Ltd., 2000.
3. Mike Easey, "Fashion Marketing", Blackwell Science, 2002.

**REFERENCE:**

1. Maurice J. Johnson & Evelyn C. Moore, "Apparel Product Development", Prentice Hall Inc., 2001.

<b>FT6604</b>	<b>APPAREL COSTING</b>	<b>L T P C</b>
		<b>3 0 0 3</b>

**OBJECTIVE:**

- To facilitate better understanding of apparel costing and foreign exchange management

**UNIT I** **9**  
 Cost accounting, elements of cost, classification of cost elements – examples from apparel industry, methods of costing

**UNIT II** **5**  
 Cost profit volume analysis, breakeven analysis; standard costing, analysis of variance

**UNIT III** **17**  
 Costing of fabrics; costing of apparel – accounting of prime costs and overhead costs, allocation of overheads; cost sheet preparation

**UNIT IV** **9**  
 Foreign exchange mechanisms, exchange rates; foreign exchange exposure management – risks, strategies to reduce risk

**UNIT V** **5**  
 Budget, types of budgets, budgeting and control in apparel industry

**TOTAL : 45 PERIODS**

**OUTCOMES:**

At the end of this course, the students would have knowledge on

- Cost accounting and cost elements
- Cost elements involved in fabric and apparel costing
- Ascertaining apparel product standard that maximise quality while balancing cost restrictions

**TEXT BOOKS:**

1. Pandey I. M., "Financial Management", Vikas Publishing House Pvt. Ltd., New Delhi, 8th Edition, 1999

2. Prasanna Chandra, "Financial Management, Theory and Practice, Tata McGraw-Hill Publishing Company Ltd, 5th Edition, New Delhi, 2001

**REFERENCES:**

1. Aswat Damodaran, "Corporate Finance Theory and Practice", John Wiley & Sons, 2000
2. James C., Van Home., "Financial Management and Policy", Prentice Hall of India Pvt. Ltd., New Delhi, 1980
3. Thukaram Rao M.E., "Cost and Management Accounting" New Age International, Bangalore, 2004
4. Khan and Jain, "Basic financial Management & Practice", Tata McGraw Hill, New Delhi, 5th edition, 2001

**FT6605****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

**UNIT II****13**

Methods study – introduction, techniques of recording; method analysis techniques; principles of motion economy; method study in garment manufacture; ergonomics- importance, workplace design, fatigue

**UNIT III****13**

Work measurement – introduction; time study – equipment and procedure; standard data; predetermined time standards; work sampling techniques; incentive wage system; work measurement applied to garment industry

**UNIT IV****5**

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

**UNIT V****9**

Statistical Process Control – data collection; concept of AQL, control charts in quality control; process capability

**TOTAL : 45 PERIODS****OUTCOMES:**

Upon completion of this course the student will be able to apply the following methodologies in apparel industry.

- Method study, work measurement
- Layout study and line balancing
- Statistical process control

**TEXTBOOKS:**

1. Khanna O. P. and Sarup A., "Industrial Engineering and Management", Dhanpat Rai Publications, New Delhi, 2005
2. George Kanwaty, "Introduction to Work Study", ILO, Geneva, 1989
3. Norberd Lloyd Enrick, "Industrial Engineering Manual for Textile Industry", Wiley Eastern (P) Ltd., New Delhi, 1988
4. Enrick N. L., "Time study manual for Textile industry", Wiley Eastern (P) Ltd., 1989

## REFERENCES:

1. Chuter A. J., "Introduction to Clothing Production Management", Black well Science, U. S. A., 1995
2. Richard I. Levin. and David S. Rubin., "Statistics for Management", 7th Edition, Prentice Hall of India Pvt. Ltd., New Delhi, 1997
3. David M. Levine, Timothy C. Krehbiel and Mark L. Berenson., "Business Statistics: A First Course", Pearson Education Asia, New Delhi, 2nd Edition, 2000
4. Panneerselvam R., "Production and Operation Management", Prentice Hall of India, 2002
5. Edward S. Buffa and Rakesh Sarin., "Modern Production and Operations Management", John Wiley & Sons, U. S. A., 1987
6. Lee J. Krajewski and Larry P. Ritzman., "Operations Management: Strategy and Analysis", Addison Wesley, 2000
7. Chase, Aquilano and Jacobs., "Production and Operations Management", Tata McGraw- Hill, New Delhi, 8th Edition, 1999

**FT6606**

**APPAREL MARKETING AND MERCHANDISING**

**L T P C  
3 0 0 3**

## OBJECTIVE:

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

### **UNIT I INTRODUCTION TO APPAREL BUSINESS 9**

International apparel business pattern, basic business concepts in Indian apparel export house, business operations in China and other south Asian countries. Business patterns for Indian apparel retail and home textiles. Understanding from concept board to finished product and its sequence.

### **UNIT II MARKETING FOR APPAREL AND TEXTILE PRODUCTS 9**

Defining marketing, marketing mix the objectives of marketing department, market research, different types of markets, marketing strategies with respect to a product/brand, Indian apparel houses international marketing strategies and domestic marketing strategies, marketing models, B to B marketing, B to C marketing, direct marketing, digital marketing.

### **UNIT III MERCHANDISING 9**

Concepts of merchandising, concepts and apparel product lines, dimensions of product change, determination and development of product line and product range. Creative and technical design in 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 a 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

- Concept of marketing and merchandizing in the apparel industry in India
- Procedure involved in the export of apparel

**TEXTBOOKS:**

1. Elian stone, Jean A samples, "Fashion Merchandising", McGraw Hill Book Company, New York, 1985.
2. Shivaramu S., "Export Marketing" – A Practical Guide to Exporters", Wheeler Publishing, Ohio, 1996.

**REFERENCE:**

1. Ruth E. Glock, Grace I. Kunz "Apparel Manufacturing Sewn Product Analysis" Fourth Edition, Pearson Prentice Hall, NJ, 2005.

**FT6611**

**GARMENT CAD LABORATORY**

**L T P C  
0 0 3 2**

**OBJECTIVE:**

To train the students in CAD used for pattern making of garments

**LIST OF EXPERIMENTS**

1. Development of the 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. Reverse pattern Engineering
10. Grading rules
11. Marker planning and optimisation

**TOTAL : 45 PERIODS**

**OUTCOME:**

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

**LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS**

- Computer with Marker planning software - 15 No.
- Pattern Digitizer - 02 No.
- Printer / plotter (above 42") - 01 No.

**FT6612**

**GARMENT CONSTRUCTION LABORATORY – II**

**L T P C  
0 0 3 2**

**OBJECTIVE:**

To train the students in construction of garments

**LIST OF EXPERIMENTS**

1. Sewing and finishing formal men's top wear.
2. Sewing and finishing formal men's bottom wear.
3. Sewing and finishing basic women's top wear.
4. Sewing and finishing basic women's bottom wear.
5. Sewing and finishing kid's wear.

**TOTAL : 45 PERIODS**

**OUTCOME :**

Upon completion of this practical course, the student will be able to sew and finish different types of wears.

**LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS**

Folding clips ¼", ½", 3".	-	2 each
Rib cutting machines	-	1
Single needle lock stitch machine	-	15
Flat lock machine with elastic attachment	-	1
Feed off the arm machine	-	1
Over lock machine	-	3
Button holing & button stitching machine	-	1 each
Cylinder bed Sewing machines	-	1 (Preferable)
Collar & Cuff recessing machine	-	1 (Preferable)

**CONSUMABLES:****(To be brought by students)**

Needles  
 Canvas material  
 Sewing threads  
 Fusing canvas  
 Elastics  
 Sponge  
 Draw cords  
 Fasteners

**FT6613****MINI PROJECT AND DESIGN COLLECTION****L T P C  
0 0 3 2****OBJECTIVES:**

- To understand Fashion Forecasting w.r.t colour, pattern and materials used
- learn to prepare story / mood board
  - learn about design details, fabrics and accessories
  - To develop garments

**EXPERIMENTS**

Preparation of garments as per the current trend / design style.  
 Preparation of costing sheet for each garment designed  
 Documenting the Design Collection in suitable format and Final Presentation

(Minimum of 4 garments is to be developed in the course)

**TOTAL : 45 PERIODS****FT6701****VISUAL MERCHANDISING****L T P C  
3 0 0 3****OBJECTIVES:**

- To introduce the student to the fashion business segments
- To acquaint the students with fashion communication tools

<b>UNIT I</b>	<b>9</b>
Fashion Business - Nature – Environment – Segment of Fashion Industry. Merchandising – Principles, types. Product presentation – role of consumer.	
<b>UNIT II</b>	<b>12</b>
Visual display - Fashion communication – Visual / 3D visual – Elements of visual merchandising. Visual merchandising as a communication tool, presentations in visual merchandising, visual merchandising and enhanced customer buying decision, interiors with respect to brand, 65 sensory elements, signs and graphics, focal point for season and type of sale.	
<b>UNIT III</b>	<b>12</b>
Objectives of Store planning, location, design, retail image mix, and layout, the circulation plan for retail formats and a generic apparel and fashion store, buying, mark-up and mark-down in merchandise management, private apparel brands and labels. – windows - interiors – optimizing techniques in retail space. Study on apparel franchising, franchising in India.	
<b>UNIT IV</b>	<b>6</b>
Optimize apparel assortments – retail environment defining. Comparison of Visual Merchandising with Fashion Merchandising.	
<b>UNIT V</b>	<b>6</b>
Assortment planning – Visual data management – Data sharing – Assortment planning – Visualization & printing.	

**TOTAL : 45 PERIODS**

**OUTCOMES:**

The course would

- develop sound knowledge on store planning and optimizing apparel assortments
- prepare the students with knowledge on visual merchandising concepts

**TEXTBOOKS:**

1. Marian L.Davis, “Visual Design in Dress”, Prentice Hall inc., 1976.
2. Elaine Stone, “Fashion Merchandising”, Blackwell Science Ltd., 2000.
3. Martin.M. Pegler, “Visual Merchandising and Display”, (fifth edition), Fair Child Publications, 2011.

**REFERENCES:**

1. Frings G. S. “Fashion-from concept to consumer”.
2. Gibson G. Vedamani., “Retail Management Functional Principles & Practices, Third Edition” Jaico Publishing House, 2003.
3. Mike Easey, “Fashion Marketing ; Blackwell Science”, 2000.
4. Maurice J. Johnson and Evelyne C. Moore, “Apperal product development”, Prentice Hall inc. 2001.

**GE6757**

**TOTAL QUALITY MANAGEMENT**

**L T P C  
3 0 0 3**

**OBJECTIVE :**

- To facilitate the understanding of Quality Management principles and process.

**UNIT I INTRODUCTION**

**9**

Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM - Quality statements - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Costs of quality.

**UNIT II TQM PRINCIPLES 9**

Leadership - Strategic quality planning, Quality Councils - Employee involvement - Motivation, Empowerment, Team and Teamwork, Quality circles Recognition and Reward, Performance appraisal - Continuous process improvement - PDCA cycle, 5S, Kaizen - Supplier partnership - Partnering, Supplier selection, Supplier Rating.

**UNIT III TQM TOOLS AND TECHNIQUES I 9**

The seven traditional tools of quality - New management tools - Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT - Bench marking - Reason to bench mark, Bench marking process - FMEA - Stages, Types.

**UNIT IV TQM TOOLS AND TECHNIQUES II 9**

Control Charts - Process Capability - Concepts of Six Sigma - Quality Function Development (QFD) - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures.

**UNIT V QUALITY SYSTEMS 9**

Need for ISO 9000 - ISO 9001-2008 Quality System - Elements, Documentation, Quality Auditing - QS 9000 - ISO 14000 - Concepts, Requirements and Benefits - TQM Implementation in manufacturing and service sectors..

**TOTAL: 45 PERIODS**

**OUTCOME :**

- The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.

**TEXTBOOK:**

1. Dale H. Besterfield, et al., "Total quality Management", Pearson Education Asia, Third Edition, Indian Reprint, 2006.

**REFERENCES:**

1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8<sup>th</sup> Edition, First Indian Edition, Cengage Learning, 2012.
2. Suganthi.L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006.
3. Janakiraman. B and Gopal .R.K., "Total Quality Management - Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.

**MG6089**

**SUPPLY CHAIN MANAGEMENT**

**L T P C**

**3 0 0 3**

**OBJECTIVE:**

- To provide an insight on the fundamentals of supply chain networks, tools and techniques.

**UNIT I INTRODUCTION 5**

Role of Logistics and Supply chain Management: Scope and Importance- Evolution of Supply Chain -Decision Phases in Supply Chain - Competitive and Supply chain Strategies – Drivers of Supply Chain Performance and Obstacles.

**UNIT II SUPPLY CHAIN NETWORK DESIGN 10**

Role of Distribution in Supply Chain – Factors influencing Distribution network design – Design options for Distribution Network Distribution Network in Practice-Role of network Design in Supply Chain – Framework for network Decisions.

**UNIT III LOGISTICS IN SUPPLY CHAIN 10**

Role of transportation in supply chain – factors affecting transportations decision – Design option for transportation network – Tailored transportation – Routing and scheduling in transportation.



<b>UNIT IV</b>	<b>SOURCING AND COORDINATION IN SUPPLY CHAIN</b>	<b>10</b>
Role of sourcing supply chain supplier selection assessment and contracts- Design collaboration - sourcing planning and analysis - supply chain co-ordination - Bull whip effect – Effect of lack of co-ordination in supply chain and obstacles – Building strategic partnerships and trust within a supply chain.		
<b>UNIT V</b>	<b>SUPPLY CHAIN AND INFORMATION TECHNOLOGY</b>	<b>10</b>
The role IT in supply chain- The supply chain IT frame work Customer Relationship Management – Internal supply chain management – supplier relationship management – future of IT in supply chain –E-Business in supply chain.		
		<b>TOTAL : 45 PERIODS</b>

**OUTCOME:**

- The student would understand the framework and scope of supply chain networks and functions.

**TEXTBOOK:**

1. Sunil Chopra, Peter Meindl and Kalra, “Supply Chain Management , Strategy, Planning, and operation”, Pearson Education, 2010.

**REFERENCES:**

1. Jeremy F.Shapiro, “Modeling the supply chain”, Thomson Duxbury, 2002.
2. Srinivasan G.S, “Quantitative models in Operations and Supply Chain Management, PHI, 2010
3. David J.Bloomberg , Stephen Lemay and Joe B.Hanna, “Logistics”, PHI 2002.
4. James B.Ayers, “Handbook of Supply chain management”, St.Lucle press, 2000.

<b>FT6702</b>	<b>HOME TEXTILES</b>	<b>L T P C</b>
		<b>3 0 0 3</b>

**OBJECTIVES**

To enable the students to learn about the

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

<b>UNIT I</b>	<b>FURNISHINGS</b>	<b>9</b>
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Developments in Textile Furnishing - Type of Furnishings Materials – Woven and non-woven – Factors affecting Selection of Home Furnishings.

<b>UNIT II</b>	<b>FLOOR COVERINGS</b>	<b>9</b>
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Recent Developments in manufacturing of floor coverings -Hard Floor Coverings, Resilient Floor Coverings, Soft Floor Coverings, Rugs, Cushion and Pads – Care of floor coverings.

<b>UNIT III</b>	<b>CURTAINS AND DRAPERIES</b>	<b>9</b>
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Advances in Home decoration -Draperies – Choice of Fabrics – Curtains – Types of Developments in Finishing of Draperies – Developments in tucks and Pleats and uses of Drapery Rods, Hooks, Tape Rings and Pins.

<b>UNIT IV</b>	<b>HOME FURNISHING</b>	<b>9</b>
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Advances in period style in, Different styles, and use of Colours, design & texture in home furnishing. Developments in living room furnishing including upholstery, Wall Hangings, Cushion, Cushion Covers, Bolster and Bolster Cover.

**UNIT V BED LINENS****9**

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.

**TOTAL : 45 PERIODS****OUTCOMES:**

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

- Know about different types of home textiles
- Understand the production method of different types of home textile products

**TEXTBOOKS:**

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., 1973

**REFERENCE:**

1. Wingate I.B. & Mohler J.F., “Textile Farbics & Their Selection”, Prentice Hall Inc., New York, 1984

**FT6711****APPAREL ENGINEERING AND PRODUCT DEVELOPMENT  
LABORATORY****LT P C  
0 0 2 1****OBJECTIVE:**

To train the students in apparel engineering including sourcing of fabrics and designing of apparel

**LIST OF EXPERIMENTS**

1. Design of Apparel for specific enduse applications.
2. Sourcing of suitable fabric for the intended applications.
3. Development of patterns for the design
4. Sewing and finishing of Apparel product for specific enduse applications.

**TOTAL: 45 PERIODS****OUTCOMES:**

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

- Source the fabric and design the apparel for specific end uses
- Sew and finish the apparel for specific end uses

**LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS**

- Working surface – pattern making / cutting table (polished or laminated top)
- Fabric and paper scissors - 15 No.
- Rulers – 12” and 36” - 15 No.
- Tailor’s square – 24” x 14” - 15 No.
- Curve rules – French curves, hip curves and vary form curve - 15 No.
- Pattern notcher, tracing wheel, awl - 5 No.
- Measuring tape - 30 No.
- Pattern weights - 10 No.
- Dress forms (Full and Half) – Kids, Children’s, Women’s and Men’s - 3 Each
- High speed industrial sewing machines
  - Single needle lock stitch machine - 30 No.
  - Double needle lock stitch machine - 02 No.
  - Over-lock machine - 02 No.
  - Feed-of-the-arm machine - 01 No.

- Button stitch machine - 01 No.
- Button hole machine - 01 No.
- Flat lock machine - 01 No.
- Zigzag machine - 01 No.
- Straight knife cutting machine - 01 No.
- Steam pressing table - 01 No.
- Iron box (electric) - 04 NO.

**GE6773**

**PRESENTATION SKILLS AND TECHNICAL SEMINAR**

**LT P C  
0 0 2 1**

**OBJECTIVES:**

- To encourage the students to study advanced engineering developments
- To prepare and present technical reports.
- To encourage the students to use various teaching aids such as over head projectors, power point presentation and demonstrative models.

**METHOD OF EVALUATION :**

During the seminar session each student is expected to prepare and present a topic on engineering/ technology, for a duration of about 8 to 10 minutes. In a session of three periods per week, 15 students are expected to present the seminar. Each student is expected to present atleast twice during the semester and the student is evaluated based on that. At the end of the semester, he / she can submit a report on his / her topic of seminar and marks are given based on the report. A Faculty guide is to be allotted and he / she will guide and monitor the progress of the student and maintain attendance also. Evaluation is 100% internal.

**TOTAL : 30 PERIODS**

**OUTCOMES:**

The course will improve the student's

- Ability to review, prepare and present technological developments
- Ability to face the placement interviews

**FT6001**

**FASHION PHOTOGRAPHY**

**LT P C  
3 0 0 3**

**OBJECTIVES:**

- To educate on principles of photography. Different techniques and lighting methods
- To educate on different types of photography equipments. Photography for different media, printing techniques.
- To impart knowledge on videography and computer applications in photography.

**UNIT I**

**9**

General principle – Photography - camera, lens. How to use your camera – Needs and methods lighting techniques for indoor / outdoor photography – methods and equipment's – advantage and disadvantages.

**UNIT II**

**9**

Image capture – parts of camera- classification and types of camera – Applications Disadvantages. Light – Natural, artificial, flash and strobe.

**UNIT III**

**9**

Photography techniques and equipment for different fields. Basic, studio, location portraiture, Photojournalism, Fashion Photography, wedding photography – Fashion shows.

**UNIT IV** **9**  
Exposure and processing of colour and black and white films. Different techniques in developing. Printing – definitions – Methods of printing for black & white color.

**UNIT V** **9**  
Photography using digital cameras – Video photography – image mixing – advertising and still life - application of computers in photography.

**TOTAL : 45 PERIODS**

**OUTCOMES:**

The students would have enhanced their knowledge on

- Different photography techniques and equipments.
- Different printing techniques.

**TEXTBOOK:**

1. W.R. Miller, "Basic Industrial Arts, Plastics, Graphics Arts, Power Mechanics, Photography", McKnight Publishing Company, Illinois, 1978.

**REFERENCE:**

1. John Hedge, "Photography Course", John Hedge Co, 1992

**FT6002** **INTIMATE APPARELS** **L T P C**  
**3 0 0 3**

**OBJECTIVE:**

- To acquaint student on the design, material, accessories and sewing aspects of intimate garments

**UNIT I** **6**  
Intimate apparels – Definition, classification, materials-fiber, fabric and accessories; physical and physiological requirements of intimate apparels

**UNIT II** **12**  
Design analysis, measurements, pattern drafting of men's intimate apparel – Long johns, tank top, tanga, boy shorts, knickers, bikini underwear, thong, boxer briefs, boxer shorts and jock strap.

**UNIT III** **12**  
Design analysis, measurements, pattern drafting of women's intimate apparel – waist petticoats, panties, camisoles, tube top, shape wear, bikini and bra.

**UNIT IV** **6**  
Intimate apparel accessories - Bra wire, hook and eye tape, ring and slider, buckle, plastic bone, elastics and sewing threads

**UNIT V** **9**  
Sewing of intimate apparels - seams, stitches, machines; lamination; moulding and welding technique.

**TOTAL : 45 PERIODS**

**OUTCOME:**

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

**TEXTBOOK:**

1. Ann Haggart, "Pattern Cutting for Lingerie, Beach Wear and Leisure Wear", Black Well Science Limited, France, 2001

**REFERENCE:**

1. W.Yu, J. Fan, S.C. Harlock, S.P. Ng., "Innovations and Technology of Womens Intimate Apparel", Wood head Publishing Limited, England 2006

**FT6003****GARMENT TRIMS AND ACCESSORIES****L T P C****3 0 0 3****OBJECTIVE:**

- To introduce students to different trims, components and fashion accessories used in apparel industry to enhance value addition

**UNIT I****9**

Garment components and trimmings – 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****9**

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****9**

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; kaustic embroidery; kasida, kathiwar; Sind; chickankari; zardosai; tribal embroideries.

**UNIT IV****9**

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

**UNIT V****9**

Printing – introduction; different methods – block printing, roller, screen, discharge, resist and pigment; styles of printing - batik, tie and dye, patch work, appliqué work, bead work

**TOTAL : 45 PERIODS****OUTCOME:**

The students would develop a capacity to offer cum use appropriate fashion accessories to enhance over-all appearance of the ensemble

**TEXTBOOK:**

1. Shailaja D. Naik, "Traditional Embroideries of India", API Publishing Corporation, New Delhi, 1996

**REFERENCE:**

1. Shella Paine, "Embroidered Textiles", Thames and Hudson Ltd., U. S. A., 1990

**OBJECTIVES:**

- To make the student acquire sound knowledge of the material characteristics required for functional clothing
- To acquaint student of the mechanism, chemistry and evaluation of chemical finishes for the functional textiles
- 

**UNIT I FIBRES, YARNS AND FABRICS FOR FUNCTIONAL APPARELS 9**

Characteristic requirements of fiber, 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 FUNCTIONAL FABRICS 9**

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

**UNIT III FUNCTIONAL APPARELS IN DIFFERENT APPLICATIONS 9**

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

**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

**UNIT V EVALUATION OF FUNCTIONAL APPARELS 9**

Standards and test method for protective fabric performance - Flame retardant finishes, Liquid repellent finishes, Antistatic, Liquid repellent, antibacterial, UV protection, mite protection; Materials and methods. 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; Ergonomics of protective clothing

**TOTAL : 45 PERIODS**

**OUTCOME:**

The students would develop and understanding of the materials, mechanism, chemistry and evaluation of functional garments

**TEXTBOOKS:**

1. Adanur S., "Wellington Sears Handbook of Industrial Textiles", Technomic Publishing Co. Inc., 1995
2. Pushpa Bajaj and Sengupta A.K., "Protective Clothing", The Textile Institute, 1992.
3. Horrocks A.R. and Anand S.C., "Handbook of Technical Textiles", Wood head Publishing Limited, Cambridge, UK.
4. Anand S.C., Kennedy J.F., Mirafat M. and Rajendran S., "Medical Textiles and Biomaterials for Health Care", Wood head Publishing Limited, Cambridge, UK.

**REFERENCES:**

1. Chellamani K.P. and Chattopadhyay D., "Yarns and Technical Textiles", SITRA, 1999.
2. Scott R.A., "Textiles for Protection", Wood head Publishing Limited, Cambridge, UK.
3. Saville.B.P., "Physical Testing of Textiles", Wood head Publishing Limited, Cambridge, UK.
4. Fan Q., "Chemical Testing of Textiles", Wood head Publishing Limited, Cambridge, UK.
5. Long A.C., "Design and Manufacture of Textile Composites", Wood head Publishing Limited, Cambridge, UK.
6. Fung W., "Coated and Laminated Textiles", Wood head Publishing Limited, Cambridge, UK.

**OBJECTIVE:**

- To make the student acquire sound knowledge of material characteristics required for protective clothing

**UNIT I FIBRES, YARNS AND FABRICS FOR PROTECTIVE GARMENTS 9**

Selection of fibres-suitability and properties of high performance fibres for various protective clothing, chemical composition and physical structure, characteristics and working of various fibres according to different end uses like thermal protection, ballistic protection, anti-microbial protection, Protection against cold etc.

Yarn and fabric (knitted, woven and Non-woven) parameters, their methods of production, effect of structure on their performance; use of composite materials in yarn and fabric formation used for protective end uses.

**UNIT II CHEMICAL FINISHES FOR PROTECTIVE GARMENTS 9**

Use of coated fabrics – different types of finishes like fire retardant finishes, for different textile materials, water repellent finishes, anti-microbial finishes; chemical finishes against radiation and chemicals – method of application of those finishes; machines and techniques used for such applications; protective finishes for health care garments.

**UNIT III PROTECTIVE GARMENTS IN OTHER 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.

**UNIT IV GARMENT CONSTRUCTION 9**

Garment construction - method of construction of garments according to various protective end uses like protection against cold, heat, chemical, ballistic protection etc.; use of different fabric type - knitted, woven, and Non-woven; coated / laminated in protective applications different places; use of inter lining and composites.

**UNIT V EVALUATION OF PROTECTIVE GARMENTS 9**

Evaluation of protective fabrics - desirable properties of protective textiles, method of testing for thermal protective performance, water, cold, abrasion and wear resistance; evaluation of resistance in to mildew, ageing, sunlight, chemical, electrostatic and electrical resistivity, impact properties; ASTM standards for protective garments.

**TOTAL : 45 PERIODS**

**OUTCOME:**

The students would develop an understanding of the materials, chemical finishes, garment construction and evaluation methods of protective garments

**TEXTBOOKS:**

- Adanur S., "Wellington sears handbook of Industrial textiles", Technomic publishing co inc, 1995.
- Pushpa Bajaj and Sengupta A.K., "Protective clothing", The Textile Institute, 1992.
- Horrocks A.R. and Anand S.C., "Handbook of Technical Textiles", Woodhead Publishing Limited, Cambridge, UK.
- Anand S.C., Kennedy J.F., Miraftab M. and Rajendran S., "Medical textiles and biomaterialsfor health care", Woodhead Publishing Limited, Cambridge, UK.

**REFERENCES:**

- Chellamani K.P. and Chattopadhyay D., "Yarns and Technical Textiles", SITRA, 1999.
- Scott R.A., "Textiles for protection", Woodhead Publishing Limited, Cambridge, UK.
- Saville.B.P., "Physical testing of textiles", Woodhead Publishing Limited, Cambridge, UK.
- Fan Q., "Chemical Testing of Textiles", Woodhead Publishing Limited, Cambridge, UK.
- Long A.C., "Design and manufacture of Textile Composites", Woodhead Publishing Limited, Cambridge, UK.
- Fung W., "Coated and laminated textiles", Woodhead Publishing Limited, Cambridge, UK.

**OBJECTIVE:**

The course is aimed at providing an overview of sizing system and its impact on the fit of the constructed silhouettes.

**UNIT I****12**

Anthropometry; Study of body measurements – infants, children's, women's and men's. perception of body appearance; figure analysis; body ideals; height and weight distributions; body proportions.

**UNIT II****12**

History of sizing system; creating sizing system. Sizing standardization-numbered, lettered sizing-Men's, Women's and Children's. Methods of sizing for mass production of clothing for men, women. Mass customization-sizing technologies and application.

**UNIT III****12**

Fit-Elements of fit-Human performance in clothing system-objective and subjective evaluation of fit. Analyzing poor fit – pattern alteration for fit. Virtual garmenting.

**UNIT IV****9**

Fabric properties influencing clothing appearance and fit. Fabric drape, seamed fabric drape, dynamic fabric drape. Objective evaluation of overall garment appearance.

**TOTAL : 45 PERIODS****OUTCOME:**

The students would develop an understanding of the complex issue of sizing and overall garment appearance

**TEXTBOOKS:**

1. Fan J, Yu W and Hunter L, "Clothing Appearance and Fit", The Textile Institute, Wood head Publishing Limited, England, 2004.
2. Ashdown S P, "Sizing in clothing", The Textile Institute, Woodhead Publishing Limited, England, 2007.
3. Sandra Betzina , "Fast Fit-Easy pattern alterations for every figure", The Taunton Press, Inc., Singapore, 2003.

**REFERENCES:**

1. Patty Brown and Janett Rice, "Ready-To-Wear Apparel Analysis", Prentice Hall, 2001.
2. Editors of Creative publishing, "The Perfect Fit- classic guide to alter patterns", Creative publishing international, USA, 2005.
3. Lynn Macintyre and Mary Tilton, "Easy Guide to sewing", Taunton press, USA, 2009.

**OBJECTIVE:**

- To introduce the students to the manufacture of leather garments and other production parameters influencing productivity

**UNIT I****OVERVIEW AND FABRICATION OF LEATHER GARMENTS –  
PRODUCTION AND PLANNING****14**

Classification of leather garments; Grading and assorting of leathers for leather garments; Property requirements for leather and lining materials; Accessories for leather garments; Various types of fasteners, fittings and other accessories. Alternative materials and their adaptability for garments. Nomenclature used for component identification in various leather garments – Wallet, hand bags, Executive bags etc. operational sequences in leather garments production.



<b>UNIT II</b>	<b>FABRICATION OF LEATHER GARMENTS – CUTTING, CLICKING AND ASSEMBLING</b>	<b>5</b>
Hand and machine cutting, knives and tools – Preparation and handling. Pattern interlocking / nesting for material optimization. Factors influencing cutting value. Various types of assembly techniques for leather garments. Pre-assembly and assembly techniques – skiving, splitting, folding, sewing etc.		
<b>UNIT III</b>	<b>PROCESS SCHEDULING AND LINE BALANCING</b>	<b>4</b>
Quality control measures in leather garment manufacture.		
<b>UNIT IV</b>	<b>DESIGN AND DEVELOPMENT</b>	<b>12</b>
Basic design development – measurement /sizing for various types of leather garments – pattern grading for leather garments. CAD application for leather garments design and production; Analysis of fashion and material trends.		
<b>UNIT V</b>	<b>ORGANIZATION AND MANAGEMENT</b>	<b>10</b>
Project feasibility reports for leather; Plant lay out, Costing and pricing for leather garments and garments. Analysis of international market trends for garments – Europe, USA and other markets. Social auditing of leather garments, occupational Health and Safety, ISO 9000 and 14000.		

**TOTAL : 45 PERIODS**

**OUTCOME:**

The students would understand interdisciplinary nature of this field and appreciate the processes involved in leather garment fabrication

**TEXTBOOKS:**

1. Skiving Manual, First Edition, 1994 CLRI, Chennai.
2. A Course Manual on Leather Garment Pattern Designing, 2007 CLRI Chennai.
3. Matric Pattern Cutting for Menswear, Winifred Aldrich, BSP Professional Books, London, 1990.

**REFERENCES:**

1. Pattern Making Manual – Womens Garments, ESMOD, Paris, 1991.
2. Fashion Drawing Methods, ESMOD, Paris 1992.
3. Grading Manual, ESMOD, Paris, 1994.
4. Training in Tanning Techniques and Leather Garments Manufacture – Course material, CLRI, Chennai, 1990.

<b>FT6008</b>	<b>SEWING THREADS AND FANCY YARNS</b>	<b>L T P C</b>
		<b>3 0 0 3</b>

**OBJECTIVE:**

- To develop comprehensive understanding of sewing threads and fancy yarns

<b>UNIT I</b>	<b>9</b>
Sewing thread – Introduction - Basic requirements and characteristics - Types of sewing thread – spun threads, core spun threads, filament threads; sewing thread production method; characteristics and application. Other sewing threads – tencel, acrylic, linen, elastic, soluble; embroidery threads.	

<b>UNIT II</b>	<b>15</b>
Ticket number in sewing threads; testing of sewing threads – physical and chemical properties; Sewability of the thread, seam efficiency index, tensile properties, abrasion resistance, friction, heat resistance, shrinkage, snarling tendency. fastness, mass evenness. Sewing performance – control of missing stitches and seam puckering, factors affecting seam strength.	

**UNIT III** **12**  
Fancy yarn – Introduction background – structures and formation of fancy yarns: Marl, corkscrew, Gimp, Boucle, snarl, loop, knop, strip, grandrelle, slub, nep, tape, chenille, metallic yarn – Manufacturing techniques

**UNIT IV** **9**  
Selection of sewing thread for different end uses, design and application of fancy yarns

**TOTAL : 45 PERIODS**

**OUTCOMES:**

The students will have understand on

- Basic requirements and characteristics of sewing and fancy yarn manufacture and its applications
- Varieties of sewing threads, their modes of manufacture and the design implications that results from their use

**TEXTBOOKS:**

1. Rao J.V and Rajendra Kr. Gaur “Sewing Threads: Technology, Stitches, Seams, Problems, Needles”, NITRA, 2006
2. Gong R. H and Wright R.M.”Fancy yarns – Their manufacture and application”, Woodhead Publishing Ltd, 2002.

**REFERENCES:**

1. Carl A Lawrence, “Fundamentals of Spun Yarn Technology”, CRC Press, Florida, USA, 2003
2. Carr H., “The Technology of Clothing Manufacture”, Blackwell Publisher, UK, 2004
3. Ruth E. Glock., “Apparel Manufacturing Sewn Product Analysis”, Prentice Hall, New Jersey, 2005.
4. Jacop Solinger, “Apparel Manufacturing Hand Book”, Litton Educational Publishing, 1980

**FT6009**

**COLOUR SCIENCE**

**L T P C**  
**3 0 0 3**

**OBJECTIVES:**

- To provide an insight into the theoretical aspects of colour science.
- To make the student understand physical and physiological aspects of colour vision.
- To introduce student to instruments of colour measurement and evaluation of colour differences

**UNIT I** **LIGHT-MATTER INTERACTION** **9**

The 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 color vision, color vision theories, defects in color vision, color vision tests, additive and subtractive color mixing, confusion in color perception.

**UNIT III** **COLOUR ORDER SYSTEMS** **9**

Description of color, various color 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, the CIE model for computer color

matching and the calculation of colour recipes, non CIE models for colour matching, limitations of computer color 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, the non linearity of subjective perception of colour, the need for specific colour difference systems, setting up of objective pass/fail standards.

**TOTAL : 45 PERIODS**

**OUTCOME:**

Upon completion of this course, the student would develop comprehensive knowledge on colour science physics, its measurement and evaluation

**TEXTBOOKS:**

1. Wright W.D., "The Measurement of Colour", Adam Hilger Ltd., 1969
2. Sule A.D., "Computer Colour Analysis", New Age International Publishers, 2002
3. McLaren K., "The Colour Science of Dyes & Pigments", Adam Hilger Ltd., 1983.
4. Shah H.S. and Gandhi R. S., "Instrumental Colour Measurement and Computer Aided Colour Matching for Textiles", Mahajan Book Publication, 1990

**REFERENCES:**

1. Park J., "Instrumental Colour Formulation: A Practical Guide", Wood head Publishing, 1993.
2. Kuehni R.G., "Computer Colorant Formulation", Lexington Books, 1975.
3. Choudhury A. K. R., "Modern Concepts of Colour and Appearance", Oxford and IBH Publishing Ltd., 2000
4. D. Travis, "Effective Colour Displays", Academic Press, 1991.

**GE6075 PROFESSIONAL ETHICS IN ENGINEERING LT P C  
3 0 0 3**

**OBJECTIVES:**

- To enable the students to create an awareness on Engineering Ethics and Human Values, to instill Moral and Social Values and Loyalty and to appreciate the rights of others.

**UNIT I HUMAN VALUES 10**

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

**UNIT II ENGINEERING ETHICS 9**

Senses of 'Engineering Ethics' – Variety of moral issues – 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 – Customs and Religion – Uses of Ethical Theories

**UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION 9**

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

**UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS 9**

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk - Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination

**UNIT V GLOBAL ISSUES****8**

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership – Code of Conduct – Corporate Social Responsibility

**TOTAL : 45 PERIODS****OUTCOME:**

- Upon completion of the course, the student should be able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society

**TEXTBOOKS:**

1. Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", Tata McGraw Hill, New Delhi, 2003.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

**REFERENCES:**

1. Charles B. Fleddermann, "Engineering Ethics", Pearson Prentice Hall, New Jersey, 2004.
2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics – Concepts and Cases", Cengage Learning, 2009
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 University Press, Oxford, 2001
5. Laura P. Hartman and Joe Desjardins, "Business Ethics: Decision Making for Personal Integrity and Social Responsibility" Mc Graw Hill education, India Pvt. Ltd., New Delhi 2013.
6. World Community Service Centre, ' Value Education', Vethathiri publications, Erode, 2011

**Web sources:**

1. [www.onlineethics.org](http://www.onlineethics.org)
2. [www.nspe.org](http://www.nspe.org)
3. [www.globalethics.org](http://www.globalethics.org)
4. [www.ethics.org](http://www.ethics.org)

**FT6010****BRAND MANAGEMENT****L T P C  
3 0 0 3****OBJECTIVE:**

- To introduce students to 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 – meaning, creation, challenges; brand design – 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:**

The students would have knowledge on consumer behaviour, brand identity and brand equity management

**TEXTBOOKS:**

1. Brad Van Auken, "Branding", Jaico Publishing House, Mumbai, India, 2010.
2. Mahim Sagar, Deepali Singh, Agrawal DP, Achintya Gupta, "Brand Management", Ane Books India Pvt. Ltd., India, 2009.

**REFERENCE:**

1. Harsh V Verma, "Brand Management", Excel Books, New Delhi, India, 2004

**FT6011** **APPAREL ENTREPRENEURSHIP** **L T P C**  
**3 0 0 3**

**OBJECTIVE:**

- Study of this subject provides an understanding of the scope of an entrepreneur, key areas of development, financial assistance by the institutions, methods of taxation and tax benefits.

**UNIT I** **ENTREPRENEURSHIP** **9**  
Entrepreneur – Types of Entrepreneurs – Difference between Entrepreneur and Intrapreneur – Entrepreneurship in Economic Growth, Factors Affecting Entrepreneurial Growth.

**UNIT II** **MOTIVATION** **9**  
Major Motives Influencing an Entrepreneur – Achievement Motivation Training, self Rating, Business Game, Thematic Apperception Test – Stress management, Entrepreneurship Development Programs – Need, Objectives.

**UNIT III** **BUSINESS** **9**  
Small Enterprises – Definition, Classification – Characteristics, Ownership Structures – Project Formulation – Steps involved in setting up a Business – identifying, selecting a Good Business opportunity, Market Survey and Research, Techno Economic Feasibility Assessment – Preparation of Preliminary Project Reports – Project Appraisal – Sources of Information – Classification of Needs and Agencies.

**UNIT IV** **FINANCING AND ACCOUNTING** **9**  
Need – Sources of Finance, Term Loans, Capital Structure, Financial Institution, management of working Capital, Costing, Break Even Analysis, Network Analysis Techniques of PERT/CPM – Taxation – Income Tax, Excise Duty – Sales Tax.

**UNIT V** **SUPPORT TO ENTREPRENEURS** **9**  
Sickness in small Business – Concept, Magnitude, causes and consequences, Corrective Measures – Government Policy for Small Scale Enterprises – Growth Strategies in small industry – Expansion, Diversification, Joint Venture, Merger and Sub Contracting.

**OUTCOME:**

The students will have confidence and entrepreneurial skills essential for the successful launch and scaling-up of an enterprise

**TEXT BOOKS:**

1. S.S.Khanka "Entrepreneurial Development" S.Chand & Co. Ltd. Ram Nagar New Delhi, 1999.
2. Kuratko & Hodgetts, "Enterprenuership – Theory, process and practices", Thomson learning 6th edition.

**REFERENCES:**

1. Hisrich R D and Peters M P, "Entrepreneurship" 5th Edition Tata McGraw-Hill, 2002.
2. Mathew J Manimala," Enterprenuership theory at cross roads: paradigms and praxis" Dream tech 2nd edition 2006.
3. Rabindra N. Kanungo "Entrepreneurship and innovation", Sage Publications, New Delhi, 1998.
4. EDII " Faulty and External Experts – A Hand Book for New Entrepreneurs Publishers: Entrepreneurship Development" Institute of India, Ahmadabad, 1986.