ANNA UNIVERSITY, CHENNAI

AFFILIATED INSTITUTIONS

R - 2013

B. TECH. TEXTILE 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.
- Develop comprehensive understanding in the area of textile manufacture, which includes fibre, yarn and fabric through course work, practical training and independent study.

PROGRAMME OUTCOMES:

The students will be able to

- Apply knowledge of mathematics, science and engineering in textile 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 textile 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 textile manufacturing industry.
- Build high moral character

ANNA UNIVERSITY, CHENNAI

AFFILIATED INSTITUTIONS

R - 2013

B. TECH. TEXTILE TECHNOLOGY

I – VIII SEMESTERS CURRICULUM AND SYLLABUS

SEMESTER - I

CODE	COURSE TITLE	L	T	P	C
THEORY					
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
PRACTICAL					
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
	TOTAL	**17**	**2**	**11**	**26**

SEMESTER – II

CODE	COURSE TITLE	L	T	P	C
THEORY					
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
PRACTICAL					
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
		19	**5**	**6**	**27**

SEMESTER – III

CODE	COURSE TITLE	L	T	P	C
THEORY					
MA6468	Probability and statistics	3	1	0	4
GE6351	Environmental Science and Engineering	3	0	0	3
TT6301	Characteristics of Textile Fibres I	3	0	0	3
TT6302	Polymer Science	3	0	0	3
TT6303	Technology of Pre Weaving Process	3	0	0	3
TT6304	Technology of Pre Spinning Process	3	0	0	3
PRACTICALS					
TT6311	Fibre Science Lab	0	0	3	2
TT6312	Spinning Process Lab – I	0	0	3	2
	TOTAL	**18**	**1**	**6**	**23**

SEMESTER – IV

CODE NO.	COURSE TITLE	L	T	P	C
THEORY					
MA6459	Numerical Methods	3	1	0	4
CE6460	Solid Mechanics	3	0	0	3
TT6401	Characteristics of Textile Fibres – II	3	0	0	3
TT6402	Fabric Structure	3	0	0	3
TT6403	Technology of Yarn Spinning	3	0	0	3
TT6404	Technology of Woven Fabric Manufacture	3	1	0	4
PRACTICALS					
TT6461	Fabric Structure Laboratory	0	0	3	2
TT6412	Spinning Process Lab – II	0	0	3	2
	TOTAL	**18**	**2**	**6**	**24**

SEMESTER – V

CODE NO.	COURSE TITLE	L	T	P	C
THEORY					
TT6501	Process Control in Spinning	3	0	0	3
TT6502	Quality Evaluation of Fibres and Yarns	3	0	0	3
TT6503	Knitting Technology	3	1	0	4
TT6504	Chemical Processing of Textile Materials - I	3	0	0	3
TT6505	Technology of Manufactured Fibre Production	3	0	0	3
PRACTICALS					
GE6562	Employability Skills	0	0	2	1
TT6511	Fabric Manufacture Lab	0	0	3	2
TT6512	Fibre and yarn quality evaluation Lab	0	0	3	2
	TOTAL	**15**	**1**	**8**	**21**

SEMESTER – VI

CODE	COURSE TITLE	L	T	P	C
THEORY					
TT6601	Fabric Quality Evaluation	3	0	0	3
TT6602	Financial Management for Textile and Apparel Industries	3	0	0	3
TT6603	Technology of Bonded Fabrics	3	0	0	3
TT6604	Mechanics of Textile Machinery	3	0	0	3
TT6605	Chemical Processing of Textile Materials - II	3	0	0	3
TT6606	Garment Manufacturing Technology	3	1	0	4
PRACTICALS					
TT6611	Fabric Quality Evaluation Lab	0	0	3	2
TT6612	Textile Chemical Processing Lab	0	0	3	2
	TOTAL	**18**	**1**	**6**	**23**

SEMESTER – VII

CODE	COURSE TITLE	L	T	P	C
THEORY					
TT6701	Total Quality Management for Textile Industry	3	0	0	3
TT6702	Operations Research for Textile Industry	3	0	0	3
TT6703	Clothing comfort	3	0	0	3
TT6704	Structural Mechanics of Fabrics	2	0	0	2
TT6705	Structural Mechanics of Yarns	2	0	0	2
	Elective – I	3	0	0	3
	TOTAL	**16**	**0**	**0**	**16**

SEMESTER – VIII

CODE NO.	COURSE TITLE	L	T	P	C
THEORY					
	Elective II	3	0	0	3
	Elective III	3	0	0	3
PRACTICALS					
TT6811	Project Work	0	0	12	6
	TOTAL	**6**	**0**	**12**	**12**

TOTAL NO OF CREDITS : 172

LIST OF ELECTIVES

B. TECH. TEXTILE TECHNOLOGY

ELECTIVE I

CODE NO.	COURSE TITLE	L	T	P	C
GE6075	Professional Ethics in Engineering	3	0	0	3
TT6001	High Performance Fibres	3	0	0	3
TT6002	Characterisation of Polymers	3	0	0	3
GE6083	Disaster Management	3	0	0	3

ELECTIVE II

CODE NO.	COURSE TITLE	L	T	P	C
FT6605	Industrial Engineering in Apparel Industry	3	0	0	3
TT6004	Apparel Production machinery	3	0	0	3
FT6606	Apparel Marketing and Merchandising	3	0	0	3
GE6084	Human Rights	3	0	0	3

ELECTIVE – III

CODE NO.	COURSE TITLE	L	T	P	C
TT6006	Supply Chain Management for Textile Industry	3	0	0	3
TT6007	Medical Textiles	3	0	0	3
TT6008	Textile Reinforced Composites	3	0	0	3

HS6151 **TECHNICAL ENGLISH – I** **L T P C**
3 1 0 4

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.

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

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 L T 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

OUTCOMES:

- 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", 41st 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", 3rd 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 modulii 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_2, 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

OUTCOMES:

- 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 L T 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: Tg, 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 NANOCHEMISTRY 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

OUTCOMES:

- 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., "Nanochemistry: 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.

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, 50th 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, 2nd 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	L	T	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.

GE6162 ENGINEERING PRACTICES LABORATORY L T P C

0 0 3 2

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. Jeyapoovan T., Saravanapandian M. & Pranitha S., “Engineering Practices Lab Manual”, Vikas Puplishing 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** **L T 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

OUTCOMES:

- 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

OUTCOMES:

- 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, percelain tile, dropper (each 30 Nos.)

HS6251 TECHNICAL ENGLISH II L T P C
3 1 0 4

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 parallelopipeds.

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", 41st 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", 3rd 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 semiconductor – variation of Fermi level with temperature and impurity concentration –– Hall effect –Determination of Hall coefficient – Applications.

UNIT III MAGNETIC AND SUPERCONDUCTING MATERIALS 9

Origin of magnetic moment – Bohr magneton – comparison of Dia, Para and Ferro magnetism – Domain theory – Hysteresis – soft and hard magnetic materials – antiferromagnetic materials – Ferrites and its applications

Superconductivity: properties – Type I and Type II superconductors – BCS theory of superconductivity(Qualitative) - High T_c superconductors – Applications of superconductors – SQUID, cryotron, magnetic levitation.

UNIT IV DIELECTRIC MATERIALS 9

Electrical susceptibility – dielectric constant – electronic, ionic, orientational and space charge polarization – frequency and temperature dependence of polarisation – internal field – Claussius – Mosotti relation (derivation) – dielectric loss – dielectric breakdown – uses of dielectric materials (capacitor and transformer) – ferroelectricity and applications.

UNIT V ADVANCED ENGINEERING MATERIALS 9

Metallic glasses: preparation, properties and applications. Shape memory alloys (SMA): Characteristics, properties of NiTi alloy, application, Nanomaterials– Preparation -pulsed laser deposition – chemical vapour deposition – Applications – NLO materials –Birefringence- optical Kerr effect – Classification of Biomaterials and its applications

TOTAL: 45 PERIODS

OUTCOMES:

- The students will have the knowledge on physics of materials and that knowledge will be used by them in different engineering and technology applications.

TEXT BOOKS:

1. Arumugam M., Materials Science. Anuradha publishers, 2010
2. Pillai S.O., Solid State Physics. New Age International(P) Ltd., publishers, 2009

REFERENCES:

1. Palanisamy P.K. Materials Science. SCITECH Publishers, 2011
2. Senthilkumar G. Engineering Physics II. VRB Publishers, 2011
3. Mani P. Engineering Physics II. Dhanam Publications, 2011
4. Marikani A. Engineering Physics. PHI Learning Pvt., India, 2009

CY6251 ENGINEERING CHEMISTRY - II L T P C
3 0 0 3

OBJECTIVES:

- To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.
- Principles of electrochemical reactions, redox reactions in corrosion of materials and methods for corrosion prevention and protection of materials.
- Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells.
- Preparation, properties and applications of engineering materials.
- Types of fuels, calorific value calculations, manufacture of solid, liquid and gaseous fuels.

UNIT I WATER TECHNOLOGY 9

Introduction to boiler feed water-requirements-formation of deposits in steam boilers and heat exchangers- disadvantages (wastage of fuels, decrease in efficiency, boiler explosion) prevention of scale formation -softening of hard water -external treatment zeolite and demineralization - internal treatment- boiler compounds (phosphate, calgon, carbonate, colloidal) - caustic embrittlement -boiler corrosion-priming and foaming- desalination of brackish water –reverse osmosis.

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

OUTCOMES:

- 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

GE6252 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING L T P C
4 0 0 4

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 & MEASURMENTS 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.

GE6253 ENGINEERING MECHANICS L T P C
3 1 0 4

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", 8th Edition, Tata McGraw-Hill Publishing company, New Delhi (2004).
2. Vela Murali, "Engineering Mechanics", Oxford University Press (2010)

REFERENCES:

1. Hibbeller, R.C and Ashok Gupta, "Engineering Mechanics: Statics and Dynamics", 11th Edition, Pearson Education 2010.
2. Irving H. Shames and Krishna Mohana Rao. G., "Engineering Mechanics – Statics and Dynamics", 4th 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", 3rd 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", 3rd Revised Edition, Tata McGraw-Hill Publishing company, New Delhi 2008.

GE6261 COMPUTER AIDED DRAFTING AND MODELING LABORATORY L T 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:

Sl.No	Description of Equipment	Quantity
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.

GE6262 PHYSICS AND CHEMISTRY LABORATORY – II

L	T	P	C
0	0	2	1

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)

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

OUTCOMES:

- 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:

1. Traveling microscope, meter scale, Knife edge, weights
2. Band gap experimental set up
3. Burette, Capillary tube, rubber tube, stop clock, beaker and weighing balance

4. spectrometer, prism, sodium vapour lamp.
5. Air-wedge experimental set up.
6. 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)

1 Determination of alkalinity in water sample
2 Determination of total, temporary & permanent hardness of water by EDTA method
3 Estimation of copper content of the given solution by EDTA method
4 Estimation of iron content of the given solution using potentiometer
5 Estimation of sodium present in water using flame photometer
6 Corrosion experiment – weight loss method
7 Conductometric precipitation titration using $BaCl_2$ and Na_2SO_4
8 Determination of CaO in Cement.

TOTAL: 30 PERIODS

OUTCOMES:

- 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:

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 R.C., “Vogel’s Text book of quantitative analysis chemical analysis”, ELBS 5th Edn. Longman, Singapore publishers, Singapore, 1996.
4. 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, percelain 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

1. UNIX COMMANDS **15**

Study of Unix OS - Basic Shell Commands - Unix Editor

2. SHELL PROGRAMMING **15**

Simple Shell program - Conditional Statements - Testing and Loops

3. C PROGRAMMING ON UNIX **15**

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
- 3 3 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 L T P C
3 1 0 4

OBJECTIVE:

- 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

OUTCOMES:

- 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 engineering and 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.

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_2, NO_X, 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).
2. Benny Joseph, ‘Environmental Science and Engineering’, Tata McGraw-Hill, New Delhi, (2006).

REFERENCES:

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

TT6301 CHARACTERISTICS OF TEXTILE FIBRES I **L T P C**
3 0 0 3

OBJECTIVES:

To enable the students to

- Enhance their knowledge related to the structure and morphology of textile fibres.
- Understand the mechanical, physical characteristics of each fiber in detail.

UNIT I STRUCTURE OF FIBRES 6

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

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 sorption – 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 factor and yield point – determination of yield point. Stress-strain relations of natural and manmade 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

OUTCOME:

Upon completion of this course, the student shall be

- Able to correlate the physical properties of fibre to its microstructure and its influence to other characteristics.
- Able to choose appropriate fibre for the required property.

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. Mukhopadhyay S. K., “Advances in Fibre Science”, The Textile Institute,1992.

REFERENCES:

1. Meredith R., “Mechanical Properties of Textile Fibres”, North Holland, Amsterdam, 1986.
2. Hearle J. W. S. Lomas B. and Cooke W. D., “Atlas of Fibre Fracture and Damage to Textiles”, The Textile Institute, 2nd Edition, 1998.
3. Raheel M. (ed.), “Modern Textile Characterization Methods”, Marcel Dekker, 1995.
4. Mukhopadhyay S. K., “The Structure and Properties of Typical Melt Spun Fibres” Textile Progress,

Vol. 18, No. 4, Textile Institute, 1989.
5. Hearle J.W.S., "Polymers and Their Properties, Vol.1. Fundamentals of Structures and Mechanics", Ellis Horwood, England, 1982
6. Greaves P.H. and Aville B.P., "Microscopy of Textile Fibres", Bios Scientific, U.K., 1995
7. Saville, "Physical Testing of Textiles", M. K. Book Distributors, 1998

TT6302 POLYMER SCIENCE L T P C
3 0 0 3

OBJECTIVES:

To enable the students to learn about the

- Various polymerisation techniques
- Fibre forming polymer characteristics and evaluation techniques
- Knowledge on processing of regenerated fibres
- Need of various additives in polymer processing.

UNIT I POLYMERIZATION 9

Polymers – Classifications – Polymerization – Mechanisms – Chain Polymerization (Free radical, ionic and Ziegler Natta). Polymerization Techniques – Bulk, Solution, Suspension, Emulsion, Solid and Liquid Phase. Polycondenzation Techniques – Melt, Solution and Interfacial.

UNIT II IMPORTANT POLYMERS 9

Synthesis, properties and Applications : Polyethylene (LDPE & HDPE), Polyacrylonitrile, Polymethyl methacrylate, Polyesters (PET), Polyamides – Nylon 6, Nylon 6,6 , Polyurethane, Polyvinylchloride, Polypropylene, Polytetrafluoroethylene.

UNIT III CHARACTERIZATION OF POLYMERS 9

Degree of Polymerization – Glass Transition Temperature – Factors affecting T_g - Determination of T_g – Dilatometer and Thermomechanical methods. Determination molecular weights – Weight average – Light scattering, Number average – End group analysis, Viscosity average – Ubbelholde viscometer. Thermal characterization – TGA and DSC.

UNIT IV REGENERATED CELLULOSE AND PROTEIN 9

Manufacture of Viscose, Cuprammonium and Acetate rayon - Modified high wet modulus – Polynosic, Lyocell – Super high wet modulus. Regenerated proteins.

UNIT V POLYMER PROCESSING AND REUSE OF POLYMERS 9

Additives of Polymers – Fillers, Plasticizers, Anti-oxidants, UV Stabilizers and Coloring agents. Polymer processing methods – Moulding, Extrusion, Calendering and Film cating. Recovery from Polyester and Nylon. Reuse of acrylic and polypropylene wastes.

TOTAL : 45 PERIODS

OUTCOMES:

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

- Understand the various techniques in polymerisation

- Understand synthesis of few important polymers in textile
- Correlate the physical properties of polymer and additives with the microstructure and property of polymer.

TEXTBOOKS:

1. Gowrikar V. R. , Viswanathan N.V. and Jayadev Sreedhar, “Polymer Science”, New Age Publication, New Delhi 2003.
2. Gupta V. B. and Kothari V. K. , “Manufacture Fibre Technology”, Chapman and Hall Publication, UK 1997.
3. Billmayer F. M., “ Text Book of Polymer science”, Wiley Inter Science, New York, 2002.

REFERENCES:

1. Odion G., “Principles of Polymerization”, John Wiley, UK, 2002.
2. Woodings C., “Regenerated Cellulose Fibres”, Woodhead Publishing, UK, 2000.

TT6303 TECHNOLOGY OF PRE WEAVING PROCESS L T P C
3 0 0 3

OBJECTIVES:

To enable the students to learn about the

- Theory of preparation of yarn for fabric formation and various preparatory process, and
- Selection and control of process variables during weaving preparatory.

UNIT I BASICS OF WINDING 9

Objects of winding; principles of cheese and cone winding machines; uniform build of yarn package; types of drums – half accelerated and fully accelerated drums; control of balloons; Classification of yarn faults and its removal; concepts in yarn clearing – mechanical, optical and electronic clearers; knotters and splicers

UNIT II PROCESS CONTROL IN WINDING 9

Faults in wound packages, their causes and remedies; winding synthetic and blended yarns; weft winding; winding for colouration; quality of knots and splices; study of modern automatic winders. winding performance; productivity; maintenance; quality control; material handling.

UNIT III WARPING 5

Objectives of warping, material flow in beam warping and creels used in warping machines; sectional warping machines.

UNIT IV SIZING 9

Objectives of sizing; sizing materials and recipii used for different types of fibers; size preparation equipment; sizing machines; sizing filament yarns; concept of single end sizing, combined dyeing and sizing. Control concepts in modern sizing; energy conservation in sizing; Sizing defects and production calculations.

UNIT V PROCESS CONTROL IN WARPING AND SIZING 9

Process control in warping (production calculation, machine and labor productivity, control of end breaks, quality and hard waste in warping); Control systems used in sizing machine.

UNIT VI DRAWING-IN 4

Need for drawing-in operation; manual and automatic drawing- in, leasing, knotting and pinning machines; selection and care of reeds, healds and drop pins, control of cross ends and extra ends and calculations.

TOTAL : 45 PERIODS

OUTCOME:

Upon completion of this course, the student shall be able to know the various preparatory processes, and controlling of process variables at preparatory to achieve the fabric with required qualities.

TEXTBOOKS:

1. John A. Iredale "Yarn Preparation: A Hand Book", Textile Institute, Manchester, 1992.
2. Lord P. R. and Mohamed M.H., "Weaving: Conversion of Yarn to Fabric", Merrow, 1992.

REFERENCE:

1. Ormerod A. and Sondhelm W. S., "Weaving: Technology and Operations", Textile nInstitute, 1995

TT6304 TECHNOLOGY OF PRE SPINNING PROCESS L T P C
3 0 0 3

OBJECTIVE:

To enable the students to learn the theory of various operations carried out at different stages of pre spinning process, which would be helpful to them in understanding the influence of various parameters on quality of the yarn and productivity.

UNIT I INTRODUCTION 9

Sequence of spinning machinery for producing carded, combed and blended yarns in short staple and long staple spinning system; yarn numbering systems- direct, indirect and conversions; influence of characteristics of raw material – fibre fineness, length, strength, elongation, stiffness, fibre friction, cleanliness on spinning performance; spinnability

UNIT II GINNING AND BLOWROOM MACHINERY 9

Description and working of different types of gins; selection of right type of gins; ginning performance on yarn quality; objects, principle and description of opening, cleaning and blending machines used in blowroom; chute feed; cleaning efficiency, production
calculations.

UNIT III CARDING MACHINE 9

Objects and principle of carding; detailed study of flat card; autolevelling; card clothing and its maintenance; drives and production calculation.

UNIT IV COMBER 9

Objectives of comber preparatory; detailed study of sliver lap, ribbon lap and super lap formers; objects and principles of combing; sequence of combing operation; combing efficiency and production calculation.

UNIT V DRAWING MACHINE AND ROVING MACHINE 9

Tasks of drawing machine; drafting systems used in modern drawing machines; autolevelling; draft and production calculation; objectives of roving machine; working of roving machine; bobbin builder mechanism – mechanical and electro-mechanical; draft, twist and production calculations.

TOTAL : 45 PERIODS

OUTCOMES:

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

- Understand the processes involved in the conversion of fibre to yarn
- Select suitable machine and process variables at different pre processes of yarn spinning to produce better quality yarn with maximum productivity and
- Design processes for producing yarn of required parameters.

TEXTBOOKS:

1. Oxtoby E., “Spun Yarn Technology “, Butterworth, London, 1987
2. Klein W., “The Technology of Short-staple Spinning “, The Textile Institute, Manchester, 1998
3. Klein W., “A Practical Guide to Opening and Carding “, The Textile Institute, Manchester, 1999
4. Klein W., “A Practical Guide to Combing, Drawing and Roving Frame “, The Textile Institute, Manchester, 1999

REFERENCES:

1. Lord P.R., “Yarn Production: Science, Technology and Economics “, The Textile Institute, Manchester, 1999
2. Salhotra K.R. and Chattopadhyay R., “Book of papers on Blowroom and Card “, Indian Institute of Technology, Delhi, 1998
3. Iredale J., “Yarn Preparation: A Handbook “, Intermediate Technology, 1992
4. Doraiswamy I., Chellamani P. and Pavendhan A., “Cotton Ginning, Textile Progress”, The Textile Institute, Manchester, 1993

TT6311 FIBRE SCIENCE LABORATORY L T P C
0 0 3 2

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 behavior 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

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

Microscope – 1 No.
Density gradient column-1 No.
Weighing balance – 1 No.
Conditioning Oven – 1No.
Spin finish tester – 1 No.

Thermogravimetric analyzer -1 No.
FTIR Spectrometer -1 No.

TT6312 SPINNING PROCESS LABORATORY - I L T P C
0 0 3 2

OBJECTIVES:

- To enable the students to handle machine and operate them practically.
- To enables the students to learn material passage, parts of machines and production calculation.

LIST OF EXPERIMENTS

1. Construction details of blow room machines and the material passage
2. Cleaning efficiency and production calculations in blow room
3. Construction details of carding machine and the material passage
4. Draft and production calculations in carding machine
5. Wire point specifications and settings in card
6. Construction details of drawinging machine, material passage, draft and production calculations
7. Production calculations in comber preparatory machines
8. Construction details of comber and material passage
9. Combing cycle, draft and production calculations
10. Construction details of roving machine, material passage
11. Draft, Twist and production calculations in roving machine
12. Study of builder mechanism of roving machine
13. Determination of degree of openness of fibre at blow room
14. Determination of neps present in the card and comber web

TOTAL : 45 PERIODS

OUTCOMES:

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

- Understand the material passage, gear diagram, components in blow room, carding machine, draw frame, comber and speed frame.
- Calculate draft, twist and production

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS

Lab model Ginning machine – 1 No.
Miniature Blowroom line – 1 No.
Carding machine – 1 No.
Drawframe – 1 No.
Comber Preparatory machines – 1 No.
Comber – 1 No.
Speed frame – 1 No.

MA6459 NUMERICAL METHODS L T P C
3 1 0 4

OBJECTIVES:

- This course aims at providing the necessary basic concepts of a few numerical methods and

give procedures for solving numerically different kinds of problems occurring in engineering and technology

UNIT I SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 10+3

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method- Solution of linear system of equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Matrix Inversion by Gauss Jordan method - Eigenvalues of a matrix by Power method.

UNIT II INTERPOLATION AND APPROXIMATION 8+3

Interpolation with unequal intervals - Lagrange's interpolation – Newton's divided difference interpolation – Cubic Splines - Interpolation with equal intervals - Newton's forward and backward difference formulae.

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION 9+3

Approximation of derivatives using interpolation polynomials - Numerical integration using Trapezoidal, Simpson's 1/3 rule – Romberg's method - Two point and three point Gaussian quadrature formulae – Evaluation of double integrals by Trapezoidal and Simpson's 1/3 rules.

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 9+3

Single Step methods - Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order equations - Multi step methods - Milne's and Adams-Bashforth predictor corrector methods for solving first order equations.

UNIT V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS 9+3

Finite difference methods for solving two-point linear boundary value problems - Finite difference techniques for the solution of two dimensional Laplace's and Poisson's equations on rectangular domain – One dimensional heat flow equation by explicit and implicit (Crank Nicholson) methods – One dimensional wave equation by explicit method.

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

OUTCOMES:

- The students will have a clear perception of the power of numerical techniques, ideas and would be able to demonstrate the applications of these techniques to problems drawn from industry, management and other engineering fields.

TEXT BOOKS:

1. Grewal. B.S., and Grewal. J.S., " Numerical methods in Engineering and Science", Khanna Publishers, New Delhi, 9th Edition, 2007.
2. Gerald. C. F., and Wheatley. P. O., " Applied Numerical Analysis", Pearson Education, Asia, New Delhi, 6th Edition, 2006.

REFERENCES:

1. Chapra. S.C., and Canale.R.P., "Numerical Methods for Engineers, Tata McGraw-Hill, New Delhi, 5th Edition, 2007.
2. Brian Bradie. "A friendly introduction to Numerical analysis", Pearson Education, Asia, New Delhi, 2007.
3. Sankara Rao. K., "Numerical methods for Scientists and Engineers", Prentice Hall of India Private Ltd., New Delhi, 3rd Edition, 2007.

CE6460 **SOLID MECHANICS** **L T P C**
3 0 0 3

OBJECTIVE:
To teach the students on design of support column, beams, pipelines, storage tanks and reaction columns and tanks after undergoing this course. This is precursor for the study on process equipment design and drawing.

UNIT I STRESS, STRAIN AND DEFORMATION OF SOLIDS 9
Rigid bodies and deformable solids – forces on solids and supports – equilibrium and stability – strength and stiffness – tension, compression and shear stresses – Hooke's law and simple problems – compound bars – thermal stresses – elastic constants and poission's ratio.

UNIT II TRANSVERSE LOADING ON BEAMS 9
Beams – support conditions – types of Beams – transverse loading on beams – shear force and bending moment in beams – analysis of cantilevers, simply – supported beams and over hanging beams – relationships between loading, S.F. and B.M. In beams and their applications – S.F.& B.M. diagrams.

UNIT III DEFLECTIONS OF BEAMS 9
Double integration method – Macaulay's method – Area – moment theorems for computation of slopes and deflections in beams.

UNIT IV STRESSES IN BEAMS 9
Theory of simple bending – assumptions and derivation of bending equation (M/I = F/Y =E/R) – analysis of stresses in beams – loads carrying capacity of beams – proportioning beam sections – leaf springs – flitched beams – shear stress distribution in beams – determination of shear stress in flanged beams.

UNIT V TORSION AND COLUMNS 9
Torsion of circular shafts – derivation of torsion equation ($T/J = fs/R = C\theta/L$) – stress and deformation in circular and hollow shafts – stresses and deformation in circular and hollow shafts – stepped shafts – shafts fixed at both ends – stresses in helical springs – deflection of springs – spring constant. Axially loaded short columns – columns of unsymmetrical sections – Euler's theory of long columns – critical loads for prismatic columns with different end conditions – effect of eccentricity.

TOTAL : 45 PERIODS

OUTCOME:
Upon completion of the program the student will be able to design the support columns, beams in a textile industrial point of view. And also they can overcome defects in the existing construction.

TEXT BOOKS:

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

REFERENCE:

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

TT6401 CHARACTERESTICS OF TEXTILE FIBRES - II L T P C
3 0 0 3

OBJECTIVE:
To enable the students to learn about torsional, flexural, optical, frictional and electrical and thermal characteristics of fibres and their importance.

UNIT I TORSIONAL CHARACTERISTICS 9
Torsional rigidity of fibres –comparison of natural and man-made fibres – measurement techniques - torsional rigidity and its relation to other fibre properties - torque – twist relations for various fibres - Torsion and time relation breaking twist angle – estimation- comparison of various fibres.

UNIT II FLEXURAL CHARACTERISTICS 9
Flexural rigidity of fibres – measurement techniques - Flexural rigidity and its relation to other fibre properties - comparison of various fibres.

UNIT III OPTICAL CHARACTERISTICS 9
Reflexion and Lustre-objective and subjective methods of measurement - refractive index and its measurement - birefringence, factors influencing birefringence - Absorption and dichroism

UNIT IV FRICTIONAL CHARACTERISTICS 9
Friction – static, limiting and kinetic friction , its measurement, comparison of fibres, directional friction in wool - frictional and surface characteristics of natural and synthetic fibres – friction and lubrication.

UNIT V ELECTRICAL AND THERMAL CHARACTERISTICS 9
Electrical resistance of fibres – measurement, factors influencing electrical resistance;di-electric behaviour–factors influencing di-electric properties; static electricity–measurement,problems and elimination techniques; thermal conductivity, thermal expansion and contraction, melting.

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of this course, the student will understand the
- Torsional, flexural, optical, frictional and electrical and thermal characteristics of fibres
- Measurement of above properties and
- Effect of different parameters on these characteristics of 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. Meredith R., “Mechanical Properties of Textile Fibres”, North Holland, Amsterdam, 1986

REFERENCES:

1. Hearle J. W. S. Lomas B. and Cooke W. D., “Atlas of Fibre Fracture and Damage to Textiles”, The Textile Institute, 2nd Edition, 1998.
2. Raheel M. (ed.), “Modern Textile Characterization Methods”, Marcel Dekker, 1995.
3. Mukhopadhyay S. K., “The Structure and Properties of Typical Melt Spun Fibres” Textile Progress, Vol. 18, No. 4, Textile Institute, 1989.
4. Mukhopadhyay S. K., “Advances in Fibre Science” The Textile Institute, 1992.
5. Hearle J.W.S., “Polymers and Their Properties, Vol.1. Fundamentals of Structures and Mechanics”, Ellis Horwood, England, 1982
6. Greaves P.H. and Aville B.P., “Microscopy of Textile Fibres”, Bios Scientific, U.K., 1995
7. Saville, “Physical Testing of Textiles”, M. K. Book Distributors, 1998

TT6402 **FABRIC STRUCTURE** **L T 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

UNIT III **13**
Bedford cords - plain and twill faced, wadded; welts and piques, wadded piques; backed fabrics - warp and weft, reversible and non-reversible fabrics; extra warp and extra weft figuring - single and double colour – loom requirements

UNIT IV **9**
Pile fabrics; warp pile - wire pile, terry pile, loose backed; weft pile – plain back and twill back velveteen, lashed pile, corduroy, weft plush – loom requirements

UNIT V **5**
Double cloth, types of stitches; Damasks; Gauze and Leno principles – loom requirements, 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. Wilson J., “Handbook of Textile Design”, Textile Institute, Manchester, 2001.
2. Horne C.E., “Geometric Symmetry in Patterns and Tilings”, Textile Institute, Manchester, 2000.
3. Seyam A. M., “Structural Design of Woven Fabrics, Theory and Practice”, Textile Institute, Manchester, 2002.
4. Georner D, “Woven Structure and Design, part 1: Single Cloth Construction”, WIRA, U.K., 1986
5. Georner D, “Woven Structure and Design, Part 2: Compound Structures”, WIRA, U.K.,1989

TT6403 **TECHNOLOGY OF YARN SPINNING** **L T P C**
3 0 0 3

OBJECTIVES:

To enable the students to learn the

- Theory of yarn formation by different spinning systems
- Effect of process parameters used in the spinning system on yarn quality.

UNIT I RING SPINNING 13

Principle of yarn formation in ring spinning machines; working of ring spinning machine; cop building; design features of important elements used in ring spinning machine; draft, twist and production calculations in ring spinning machine; end breakage rate – causes and remedies

UNIT II CONDENSED YARN SPINNING 5

Condensed yarn spinning – principle, different methods, properties; comparison with ring spun yarn

UNIT III YARN PLYING 9

Merits of plying of yarns; methods followed for plying – TFO, ring twisting; selection of twist level for plying; calculation of resultant count of plied yarns; types of fancy yarns, method of production

UNIT IV ROTOR SPINNING 9

Principle of open end spinning; principle of yarn production by rotor spinning system; design features of important elements used in rotor spinning; properties of rotor yarn

UNIT V OTHER SPINNING SYSTEMS 9

Friction and air-jet spinning methods – principle of yarn production, raw material used, structure, properties and applications; principle of yarn production by self-twist, core, wrap, integrated compound spinning systems.

TOTAL : 45 PERIODS

OUTCOMES:

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

- Understand the theory of formation of yarn by ring, rotor, friction, airjet and other spinning systems
- Select suitable machine and process variables at different processes of yarn spinning to produce required quality yarn
- Understand the spinning system to be used for different raw materials and to produce yarn for specific end use.

TEXTBOOKS:

1. Oxtoby E., “Spun Yarn Technology “, Butterworth Publications, London, 1987
2. Klein W., “The Technology of Short-staple Spinning”, The Textile Institute, Manchester,1998
3. Klein W., “A Practical Guide to Ring Spinning “, The Textile Institute, Manchester, 1999
4. Klein W., “New Spinning Systems “, The Textile Institute, Manchester, 1993

REFERENCES:

1. Lord P.R., “Yarn Production: Science, Technology and Economics”, The Textile Institute, Manchester, 1999
2. Shaw J., “Short-staple Ring Spinning, Textile Progress”, The Textile Institute, Manchester, 1982
3. Iredale J., “Yarn Preparation: A Handbook “, Intermediate Technology, 1992

TT6404 TECHNOLOGY OF WOVEN FABRIC MANUFACTURE L T P C
3 1 0 4

OBJECTIVES:

To enable the students to learn the

- Basics of weaving machine and important motions of looms

- Selection and control of process variables during fabric formation.

UNIT I INTRODUCTION TO WEAVING 9

Yarns quality requirements for high speed automatic shuttle looms and shuttle less loom; warp and weft preparation for high speed looms; Principle of weaving with hand and power looms, passage of material, motions in loom – primary, secondary and auxiliary motions, plain power loom driving, timing of motions.

UNIT II SHEDDING MOTIONS 9

Shed geometry and shedding requirement. Types of shed. Shedding mechanisms – positive and negative. Principles of tappet, dobby and jacquard shedding mechanisms, reversing mechanisms-limitations of various shedding mechanisms; Conventional and modern dobby and jacquard mechanism.

UNIT III WEFT INSERTION AND BEAT UP 9

Shuttle picking and checking mechanisms, shuttle flight and timing; Weft feeder – types, Principles of weft insertions in shuttle less looms; mechanism of weft insertion by projectile, rapier loom and jet – air and water. Multi-Phase weaving systems; Kinematics of sley, sley eccentricity; beat up mechanism in modern looms;

UNIT IV SECONDARY AND AUXILARY MOTIONS LOOMS 9

Take up and let - off motions used in plain power looms; cloth formation, weaving condition - factors and control; warp protector and warp and weft stop motion; plain power loom accessories. Automatic weft replenishment in shuttle looms – pirn changing and shuttle changing looms; mechanisms involved in automatic pirn changing – feelers, cutters, design of shuttle, three try motions; multi shuttle looms- box changing principle, Automatic pirn changing in multi shuttle loom. Weft arrival control and automation in shuttle less looms; selvedges in shuttle less looms; quick style change;

UNIT V PROCESS CONTROL & SPECIAL WEAVING PROCESS 9

Techno economics of shuttle less loom weft insertion systems; loom monitoring and control Loom stoppages and efficiency; fabric defects and value loss; fabric shrinkage in the loom - causes and control; fabric engineering. Filament weaving – Silk & Texturised yarns. Principles and mechanisms in weaving Pile fabrics, tapes and triaxial fabrics

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

OUTCOMES:

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

- Understand the functioning of weaving machine and its important motions
- Select and control the process variables at loom
- Understand the principle of forming special fabrics

TEXTBOOKS:

1. Marks R. and Robinson T.C., “Principles of Weaving”, The Textile Institute, Manchester, 1989.
2. Sabit Adanur, “Handbook of Weaving”, Technomic Publishing Co. Inc., 2001
3. Ormerod A. and Sondhelm W.S., “Weaving: Technology and operations”, Textile Institute, 1995.

REFERENCES:

1. Talukdar M.K., Sriramulu P.K. and Ajgaonkar D.B., “Weaving: Machines, Mechanisms Management”, Mahajan Publishers, Ahmedabad, 1998.
2. “Weaving: The knowledge in Technology”, Papers Presented at the Textile Institute Weaving Conference, Textile Institute, 1998.
3. Booth J.E., “Textile Mathematics Volume 3”, The Textile Institute, Manchester, 1977.
4. Lord P.R. and Mohamed M.H., “Weaving: Conversion of Yarn to Fabric”, Merrow, 1992.

5. Vangheluwe L., “Air- Jet Weft Insertion”, Textile progress, Vol. 29, No. 4, Textile Institute Publication, 1999.

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.

TT6412 SPINNING PROCESS LABORATORY - II L T P C
0 0 3 2

OBJECTIVES:

- To enable the students to learn material passage in the machine, important parts of machines, draft, twist and production calculations.
- To train the students to handle machine and operate them practically.

LIST OF EXPERIMENTS

1. Construction details of ring spinning machine and material passage
2. Draft, Twist and production calculations in ring spinning machine
3. Study of builder mechanism of ring spinning machine
4. Selection of ring travellers
5. Construction details of rotor spinning machine and material passage
6. Draft, Twist and production calculations in rotor spinning machine
7. Production of carded web using miniature card
8. Production of sliver using miniature drawing machine
9. Production of yarn using ring spinning machine
10. Production of yarn using rotor spinning machine
11. Analysis of MIS reports from spinning mills

TOTAL: 45 PERIODS

OUTCOMES:

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

- Calculate draft, twist and production rate of ring and rotor spinning machines
- Understand the formation of yarn by ring and rotor spinning systems
- Produce yarn using ring and rotor spinning system
- Analyse MIS reports from spinning mills

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS

1. Card – 1 No.
2. Draw frame – 1 No.
3. Ring frame – 1 No.
4. Rotor spinning machine – 1 No.
   (Commercial or Miniature models of above machines)

TT6501 PROCESS CONTROL IN SPINNING L T P C
3 0 0 3

OBJECTIVE:

To enable the students to understand and apply process and quality control measures during spinning of yarn

UNIT I LEVELLING 9

Different levelling methods adopted in the spinning machines to achieve better uniformity of the products; influence of the uniformity of the intermediate products on the yarn quality; effect of machines and processing parameters on product uniformity; importance of fibre mix homogeneity on yarn quality; types and levels of mixing in the preparatory processes; assessment of fibre-blend variations.

UNIT II NEP AND HOOK REMOVAL 9

Causes of nep and hook formation in the fibre-opening processes; improving the removal of neps in the carding and combing machines; maximizing the fibre hook straightening during the preparatory operations; measurement of neps and hooks.

UNIT III WASTE CONTROL 9

Control of waste in blowroom, card and combers; influence of machine and processing parameters on

waste removal; controlling the lint content in waste; cleaning efficiency and cleaning intensity.

UNIT IV PRODUCTION CONTROL 9

Factors affecting the production limits of the spinning machinery; achieving maximum production in the given machinery; new concepts in achieving higher production in the spinning machinery; role of machinery maintenance and humidity control on production efficiency; computation of the productivity indices.

UNIT V YARN QUALITY ANALYSIS & MAN-MADE FIBRE PROCESSING 9

Analysis and control of within length and between length variations and spectrogram; yarn faults classifications; causes and remedies for yarn defects. Optimum processing conditions required for man-made-fibres like polyester, viscose in the spinning machinery.

TOTAL : 45 PERIODS

OUTCOMES:

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

- Quality control measures in terms of levelling of material, neps and waste during the process
- Factors influencing production of the spinning machines
- Analysis of quality of yarn
- Special measures to be taken while processing man made fibres

TEXTBOOKS:

1. Garde A.R. and Subramaniam T.A., “Process Control in Spinning”, ATIRA Publicaitons, Ahmedabad, 1989
2. Klein W., “Man-made Fibres and their Processing” ,The Textile Institute, Manchester, 1994

REFERENCES:

1. Lord P.R., “Yarn Production; Science, Technology and Economics”, The Textile Institute, Manchester, 1999
2. Furter R., “Evenness Testing in Yarn Production Part 1 and Part II “, The Textile Institute, Manchester, 1982
3. Van der Sluijs M and Hunter L., “Neps in Cotton Lint, Textile Progess “,The Textile Institute, Manchester, 1999
4. Slater K.Yarn Evenness, “Textile Progress”, The Textile Institute, Manchester, 1986.
5. Townend P.P., “Nep Formation in Carding “, Wira, U.K., 1982

TT6502 QUALITY EVALUATION OF FIBRES AND YARNS L T P C
3 0 0 3

OBJECTIVE:

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

UNIT I INTRODUCTION 5

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

UNIT II FIBRE LENGTH AND STRENGTH ANALYSIS 9

Fibre testing, the fibre quality index and spinnablity; Fibre length and length uniformity measuring techniques. Strength Tensile Testing modes – CRT, CRE, CRL and ARL; Fibre strength, importance,

relation to yarn strength; Measurement techniques.

UNIT III FIBRE FINENESS, MATURITY AND TRASH ANALYSIS 9

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

UNIT IV YARN COUNT, TWIST AND STRENGTH 9

Yarn numbering systems-Indirect and direct systems-count conversions; Count measuring systems. Twist in single and ply yarns –twist direction – twist factor – twist and yarn strength; twist measurement and breaking twist angle measurement. Single yarn strength; Lea count strength product (CSP) and Corrected Count Strength Product (CCSP).

UNIT V YARN MASS EVENNESS AND SURFACE QUALITY 9

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

TOTAL : 45 PERIODS

OUTCOMES:

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

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

TEXTBOOKS:

1. Booth J.E., “Principle of Textile Testing”, Butterworth Publications, London, 1989
2. Saville B.P., “Physical Testing of Textiles”, Textile Institute, Manchester, 1998
3. Kothari V. K., “Testing and Quality Management”, Progress in Textile Technology Vol.1, IAFL Publications, New Delhi, 1999

REFERENCES:

1. Ruth Clock and Grace Kunz., “Apparel Manufacture – Sewn Product Analysis”, Upper Sadle River Publications, New York, 2000
2. Pradip V. Mehta., “Managing Quality in the Apparel Industry”, NIFT Publication, India, 1998
3. Sara J. Kadolph., “Quality Assurance for Textiles and Apparels”, Fair child Publications, New York, 1998
4. Slater K., “Physical Testing and Quality Control”, The Textile Institute, Vol.23, No.1/2/3 Manchester, 1993

TT6503 KNITTING TECHNOLOGY L T P C
3 1 0 4

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. Comparison of fabric properties - wovens, knits and bonded fabrics; classification of knitting processes – weft knit & warp knit; 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 (L:45 + T:15) : 60 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.
3. Gajjap B.J., “Handbook of warp Knitting Technology”, Textile Institute, Manchester, 2004.

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. Thomas D.G.B., “An Introduction to Warp Knitting”, Merrow Publishing Company, UK., 1971.
5. Sam Raz, “Warp Knitting Production”, Melliand Textilberichte GmbH, Heidelberg, Germany, 1987.
6. Die Maschenbindungen der Kettenwirkerai, “An Introduction to the Stitch Formations in Warp Knitting”, Published Employee’s Association, Karl Mayere.V., Germany, 1966.
7. Paling D.F., “Warp Knitting Technology”, Columbine Press, U.K, 1966
8. Charles Reichman, “Wool and Synthetic Knitwear Handbook”, National Knitted Outerwear Association, U.S.A, 1967
9. Charles Reichman, “Knitted Stretch Technology”, National Knitted Outerwear Association, U.S.A, 1965.

TT6504 CHEMICAL PROCESSING OF TEXTILE MATERIALS - I **L T P C**
3 0 0 3

OBJECTIVE:

To enable the students to learn about chemical structure of fibres and pre treatments involved in the wet processing of textiles.

UNIT I **9**

Chemical structure of fibres - Cotton, wool, PET polyester, Nylon 6 and 6,6, poly acrylonitrile poly propylene and poly urethane; Action of chemicals on fibres - Effect of alkalis, acids, oxidizing agents and reducing agents on cotton and viscose, wool, silk and the above synthetic fibres; Natural and other impurities in textiles and their basic properties; Singeing - Methods of singeing and their comparison, detailed study on gas singing, evaluation of singing efficiency and bio polishing; Desizing - methods of desizing and their comparison, desizing of natural and synthetic fibres and their blends, evaluation of desizing efficiency; Heat setting - principle and heat setting of PET and nylon fabrics.

UNIT II **9**

Scouring - Chemistry involved in scouring of cotton, wool, silk and synthetic fibres, process details on scouring of these fibres, assessment of scouring efficiency and bio scouring; Bleaching - Fundamentals on bleaching agents, bleaching of cotton with sodium hypochlorite and hydrogen peroxide, bleaching of wool, assessment of efficiency of bleaching; Mercerization - role of alkali concentration, stretch and temperature, effect of mercerization on structural, lustre, tensile and dyeing properties, steps involved in mercerization process, assessment of efficiency of mercerization; carbonization of wool; degumming of silk - methods and their comparison, process details on the methods and assessment of efficiency of degumming.

UNIT III **9**

Principle, construction and working of chemical processing machines - Loose stock machine; Hank and package processing machines; Yarn singeing machine; Woven and knitted fabric singeing machines; Stretching devices; Shearing and raising machines; Kiers; Mangles; Jiggers; Winch; Jet and soft flow machines; Yarn mercerizer, Chain and chainless mercerizers; Continuous scouring and bleaching machines; Washing ranges, Hydro extractors; Detwisters; Dryers; Stenters.

UNIT IV **9**

Calendering - Various objectives, construction and working of Calendering machines; Crease proofing - Mechanism of creasing, crease proofing with formaldehyde based agents namely urea-formaldehyde precondensate and dimethylol dihydroxy ethylene urea, drawbacks of these agents, advantages of low formaldehyde and free formaldehyde crease proofing agents, crease proofing with butane tetra carboxylic acid, assessment of crease proofing efficiency; Shrink proofing - Assessment of shrinkage, Principle of belt shrinking and compacting , construction and working of shrink proofing machines, assessment of shrink proofing process; Softening - Role played by softeners, methods of softening, chemical softeners and their classification, chemistry and application of cationic and silicone softeners, assessment of efficiency of softeners, end-uses; Wool finishing - Wet and dry setting of wool and their assessment; principle of Milling and milling machines, assessment of milling operation.

UNIT V **9**

Water and oil repellant finishes - Mechanisms of repellency, durable and non-durable finishing agents, basics of silicone and fluorocarbon finishes, assessment of repellent finishes; Fire retardant finish - Mechanisms of flame retardancy, durable and non durable retardants for cotton and polyester, assessment of flame retardancy; Antimicrobial finish - Mechanisms, controlled release and bound antimicrobials, assessment of the finish; introduction to use of nanotechnology in finishing.

TOTAL : 45 PERIODS

OUTCOMES:

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

- Chemical structure of the fibres
- Necessity and requirements of Pre treatments in wet processing of textiles
- Knowledge on various finishing treatments done on fabric
- Needs of various finishes to the fabric

TEXTBOOKS:

1. Shenai V. A., “Technology of Bleaching and Mercerizing”, Sevak Publications, 2003
2. Trotman E. R., “Dyeing and Chemical Technology of Textile Fibres”, B.I Publishing Pvt. Ltd., New Delhi, 1994
3. Gulrajani M. L. (ed), "Advances in the dyeing and finishing of technical textiles", Woodhead Publishing Ltd., 2013.

REFERENCES:

1. Shenai V. A., “Technology of Textile Finishing”, B.I. Publication, Mumbai, 1989.
2. Menachem Lewin and Stephen B. Sello., “Handbook of Fibre Science and Technology: Volume I: Chemical Processing of Fibres and Fabrics-Fundamentals and Preparation” and Volume II: Functional finishes, Marcel Dekker, Inc., 1983
3. Karmakar S. R., “Chemical Technology in the Pre-treatment Process of Textiles”, Elsevier sciences B.V.,1999
4. Bhagwat R. S., “Handbook of Textile Processing”, Colour Publication, Mumbai.,1999
5. Cavaco-Paulo A. and Gubitz G. M., “Textile Processing with enzymes”, Woodhead Publication Ltd., 2003
6. Heywood D., “Textile Finishing”, Wood head Publishing Ltd., 2003.
7. Schindler W. D. and Hauser P. J., "Chemical finishing of textiles", Woodhead Publishing Ltd., 2004

TT6505 TECHNOLOGY OF MANUFACTURED FIBRE PRODUCTION L T P C
3 0 0 3

OBJECTIVES:

- To enable the students to learn about the polymer rheology and the laws, and various spinning techniques of polymers
- To expose the students to advances in the spinning process

UNIT I POLYMER RHEOLOGY 9

Transport Phenomena in Fibre Manufacturing- Heat and mass; Polymer rheology-Newtonian and non-Newtonian fluids, factors affecting shear viscosity; Necessary conditions of fibre forming polymer; Melt instabilities.

UNIT II MELT SPINNING 9

Melt Spinning- Polymer Selection and Preparation, equipments, properties and applications of polyester, polyamide and polypropylene fibers.

UNIT III SOLUTION SPINNING 9

Solution spinning- Polymer Selection and Preparation, equipments, properties and applications of acrylic, polyurethane and regenerated cellulose fibres.

UNIT IV POST SPINNING OPERATIONS 9

Neck drawing, drawing systems, influence of drawing on structure and properties of fibres; Types of heat setting, influencing parameters on heat setting, influence of heat setting on fibre behavior; Spin finish composition and application; texturising.

UNIT V ADVANCES IN FIBER SPINNING 9

Liquid crystal spinning; Gel spinning; Profile fibres, hollow & porous fibres; Speciality fibres polyglycolic acid, polylactic acid, chitosan fibres preparation properties and applications.

TOTAL : 45 PERIODS

OUTCOMES:

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

- Polymer Rheology and the laws
- Various spinning techniques of polymers parameter involved in spinning synthetic yarn
- Need of various post spinning operations
- Advances in the spinning process

TEXTBOOKS:

1. Kothari V. K., "Textile Fibres: Development and Innovations", Vol. 2, Progress in Textiles, IAFL Publications, New Delhi, 2000
2. Vaidya A. A., "Production of Synthetic Fibres", Prentice Hall of India Pvt. Ltd., New Delhi, 1988
3. Nakasjima (English edition, edited by Kajiwara K. and McIntyre J. E.), "Advanced Fibre Spinning Technology", Wood head Publication Ltd., England, 1994.

REFERENCES:

1. Gupta V. B. and Kothari V. K. (Editors), "Manufactured Fibre Technology", Kluwer Academic Publishers, 1997.
2. Cook J. G., "Handbook of Textile Fibres: Vol. 2: Man Made Fibres", The Textile Inst., 5th Ed. 1984.
3. Srinivasa Murthy H. V., "Introduction to Textile Fibres", Textile Association, India, 1987.

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 graining proficiency and better participation in the class.
6.

Lab Infrastructure:

Sl. No	Description of Equipment (Minimum Configuration)	Qty Required
1	**Server**	1 No.
	PIV System	
	1 GB RAM / 40 GB HDD	
	OS: Win 2000 server	
	Audio card with headphones	
	JRE 1.3	
2	**Client Systems**	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
2. www.careerride.com

TT6511	FABRIC MANUFACTURE LABORATORY	L	T	P	C
		0	0	3	2

OBJECTIVE:

To train the students on different mechanisms of plain loom and circular knitting machines

LIST OF EXPERIMENTS

1. Analysis of Yarn faults
2. Control of production, package density, yarn faults in cone / cheese winding machine
3. Determination of depth of shed and heald shaft movements in tappet shedding mechanism
4. Preparation of pattern card for dobby shedding mechanism and way in which adjust the depth of shed
5. Study of jacquard shedding mechanism
6. Power required to insert the weft through shuttle in over and under picking mechanism
7. Study of picking mechanism in shuttleless loom
8. Control of sley eccentricity and Beat-up force in weaving
9. Study of let-off mechanisms
10. Determination of pick space through 5 and 7 wheel take-up mechanisms
11. Study of weft replenishment mechanism in shuttle looms
12. Method of achieving the required colour patterns in 4 X 1 drop box motion
13. Study of warp protector mechanism

14. Study of plain, rib and interlock circular knitting machines
15. Study of flat knitting machines

TOTAL : 45 PERIODS

OUTCOMES:

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

- Functioning of cone winding / cheese winding machine
- Different elements of plain loom and important motions of loom
- Functioning of circular knitting and flat knitting machine
- Picking mechanisms in shuttleless looms

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS

S.No.	Description of Equipment	Quantity required (R)
1.	Cone / Cheese winding machine	1
2.	Pirn winding machine	1
3.	Sizing chemicals	(Consumables) Quantity as per the requirements
4.	Tappet shedding mechanism – positive/negative	1 each
5.	Dobby shedding mechanism	1
6.	Jacquard shedding mechanism	1
7.	Shuttle picking mechanism – Over pick or under pick	1 each
8.	Beat up mechanism	1
9.	Take up mechanism (Five wheel or seven wheel)	1 each
10.	Negative let-off mechanism	1
11.	Positive let-off mechanism	1
12.	Warp protector mechanism – loose reed and fast reed	1 each
13.	Weft fork mechanism	1
14.	Automatic pirn changing mechanism	1
15.	Automatic warp stop motion	1
16.	Drop box mechanism	1
17.	Terry fabric weaving (Desirable)	1
18.	Shuttleless loom	Any one type
19.	Plain, Interlock and Rib Knitting machines	1 each

18.	Yarn fault classifier (Desirable)	1

TT6512 FIBRE AND YARN QUALITY EVALUATION LABORATORY L T P C
0 0 3 2

OBJECTIVE:
To practice the students in testing of fibres and yarns for important properties.

LIST OF EXPERIMENTS
Determination of

1. Fibre fineness
2. Fibre length
3. Fibre maturity
4. Fibre trash content
5. Bundle fibre strength
6. Fiber migration parameters
7. Roving, sliver and yarn linear density
8. Single yarn strength
9. Yarn lea strength
10. Yarn single and ply yarn twist
11. Yarn impact strength
12. Yarn to yarn abrasion
13. Unevenness of yarn
14. Assessment of yarn appearance

TOTAL : 45 PERIODS

OUTCOMES:
After the completion this practical course, the students will be able to

- Evaluate fiber and yarn characteristics using different equipments
- Analyse the results generated from these equipments
- Apply statistical techniques for better explanation

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS

S.No.	Description of Equipment	Required (R)
1.	Baer Sorter	1
2.	Fibre Bundle strength tester	1
3.	Fibre Fineness tester	1
4.	Trash Analyser	1
5.	Projection Microscope	1
6.	Nep Count Template	5
7.	Wrap Reel	1

8.	Wrap Block	1
9.	Yarn Twist Tester	1
10.	Single Yarn Strength Tester	1
11.	Bundle yarn strength tester	1
12.	Ballistic Tester	1
13.	Yarn Unevenness tester	1
14.	Yarn abrasion tester	1
15.	Weighing balance	1
16.	Yarn appearance Board Winder	1
17.	Yarn appearance Board (Standards)	1 set

TT6601 FABRIC QUALITY EVALUATION L T P C
3 0 0 3

OBJECTIVES:
To enable the students to learn about the construction of fabrics and evaluation of fabric properties and their importance

UNIT I CONSTRUCTION CHARECTERISTICS 9
Basic fabric particulars – Measurement of ends and picks per inch, count of warp and weft, determination of the type of weave, measurement of length, width, thickness and Area density (GSM); warp and weft crimp measurements for spun and filament yarn fabrics, the cover factor calculations; Fabric sampling techniques.

UNIT II STRENGTH CHARACTERISTICS 9
Tensile strength measurement – ravelled strip test and grab test – mechanical and electronic measuring systems. Tear strength – importance – measuring systems. Bursting strength and its measurement. Ballistic impact strength. Universal tensile tester - principle and operation

UNIT III COMFORT AND SURFACE CHARACTERISTICS 9
Fabric stiffness – principle of measurement of flexural rigidity; Drapeability – measurement of drape coefficient; Crease recovery measurement techniques. Wrinkle recovery assessment using standard grades; Principle and functioning of air permeability testers, water repellency, contact angle and fabric shrinkage testing; Fabric abrasion resistance – measuring technique; Fabric pilling resistance – methods of determination.

UNIT IV SPECIAL CHARACTERISTICS 5
Fabric bending hysteresis testing; Shear hysteresis measurements; Fabric compression and decompression behaviour; Fabric surface roughness and friction measurements; Fabric tensile hysteresis measurements; Fabric flame resistance testing methods; Moisture and thermal characteristics.

UNIT V FABRIC INSPECTION AND GARMENT QUALITY 13
Fabric inspection – Manual, semi-automatic and Automatic Inspection systems, classification of fabric defects, independent product quality certification, acceptable quality level, MIL standards and final

inspection. Quality assessment of garments - cutting, sewing, pressing, finishing and packageing defects.

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of this course, students would be able to

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

TEXTBOOKS:

1. Booth J.E., "Principle of Textile Testing", Butterworth Publications, London, 1989
2. Saville B.P., "Physical Testing of Textiles", Textile Institute, Manchester, 1998
3. Kothari V. K., "Testing and Quality Management", Progress in Textile Technology Vol.1, IAFL Publications, New Delhi, 1999.

REFERENCES:

1. Ruth clock and Grace Kunz., "Apparel Manufacture – Sewn Product Analysis", Upper Sadle River Publications, New York, 2000.
2. Pradip V. Mehta., "Managing Quality in the Apparel Industry", NIFT Publication, India, 1998.
3. Sara J. Kadolph., "Quality Assurance for Textiles and Apparels", Fair Child Publications, New York, 1998.
4. Slater K., "Physical Testing and Quality Control", The Textile Institute, Vol.23, No.1/2/3 Manchester, 1993.

TT6602 FINANCIAL MANAGEMENT FOR TEXTILE AND APPAREL INDUSTRIES **L T P C 3 0 0 3**

OBJECTIVES:

- To enable the students understand basics of financial management that is required for the textile industry
- To enable the students to learn about sources of capital, cost of capital and capital budgeting

UNIT I **18**

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

UNIT II **9**

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

UNIT III **5**

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

UNIT IV **13**

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

TOTAL : 45 PERIODS

OUTCOMES:

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

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

TEXTBOOKS:

1. Bhave P.V. and Srinivasan V., "Costing Accounting to Textile Mills", ATIRA, Ahmadabad, 1976
2. Khan and Jain, "Basic Financial Management and Practice", Tata McGraw Hill, New Delhi, 5th Edition, 2001.
3. Thukaram Rao M.E., "Cost Accounting and Financial Management" New Age International, Bangalore, 2004

REFERENCES:

1. Pandey I. M., "Financial Management", Vikas Publishing House Pvt. Ltd., New Delhi, 8th Edition, 1999
2. Thukaram Rao M.E., "Cost and Management Accounting" New Age International, Bangalore, 2004
3. Prasanna Chandra, "Financial Management, Theory and Practice, Tata McGraw-Hill Publishing Company Ltd, 5th Edition, New Delhi, 2001
4. James C. Vanhorne, "Financial Management and Policy", Pearson Education Asia (Low Priced Edition) 12th Edition, 2002
5. Narang, G. B. S. and Kumar V., "Production and Costing", Khanna Publishers, New Delhi, 1988
6. Aswat Damodaran, "Corporate Finance Theory and Practice", John Wiley & Sons, 2000
7. Hrishikes Bhattacharya, "Working Capital Management, Strategies and Techniques", Prentice – Hall of India Pvt. Ltd., New Delhi, 2001

TT6603 TECHNOLOGY OF BONDED FABRICS L T P C
3 0 0 3

OBJECTIVES:

To enable the students to learn about the

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

UNIT I FUNDAMENTALS OF BONDED FABRICS 5

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

UNIT II WEB FORMATION WITH STAPLE FIBRES 9

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

UNIT III MECHANICAL, CHEMICAL AND THERMAL BONDING 13

Bonded fabric production by mechanical bonding - needling, stitching, water jet consolidation; Thermal Bonding technologies; Chemical bonding – Binder polymers and bonding technologies

UNIT IV POLYMER – LAID WEB AND FABRIC FORMATION 9

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

UNIT V FINISHING AND APPLICATION OF BONDED FABRICS 9

Dry and Wet finishing; Characterisation, structure - property relationship in bonded fabrics; End uses of bonded fabrics

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of the course the student will be able to

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

TEXTBOOKS:

1. Lunenschloss J., Albrecht W. and David Sharp., "Nonwoven Bonded Fabrics", Ellis Horwood Ltd., New York, 1985.
2. Russell S., "Hand Book of Nonwovens", Textile Institute, Manchester, 2004.
3. Chapman R., "Applications of Nonwovens in Technical Textiles", Textile Institute, Manchester, 2010.

REFERENCES:

1. Mrstina V. and Feigl F., "Needle Punching Textile Technology", Elsevier, New York, 1990.
2. Dharmadhikary R. K., Gilmore T. F., Davis H. A. and Batra S. K., "Thermal Bonding of Nonwoven Fabrics", Textile Progress, Vol.26, No.2, Textile Institute Manchester,1995.
3. Jirsak O. and Wadsworth L. C., "Nonwoven Textiles", Textile Institute, Manchester, 1999.

TT6604 MECHANICS OF TEXTILE MACHINERY L T P C
3 0 0 3

OBJECTIVES:

To enable the students to learn about

- Basic elements used in the textile machinery
- Design of cams, cone drums and other important elements used in the textile machinery

UNIT I **5**

Equations of forces, motion and energy; energy stored in rotating masses.

UNIT II **9**

Clutches and brakes – types, application in textile machines; gears, gear trains; power transmission – different modes, advantages and limitations, applications

UNIT III **9**

Differential and variable speed drives – principles, application in textile machines; design of cone drums – piano feed regulation, roving machine builder mechanism; ;

UNIT IV **9**

Friction – calculations; bearings, design of drive transmitting shafts, balancing of rotating masses

UNIT V **13**

Design of winder drums; kinematics of shedding; design of tappets; beat up force, sley eccentricity; power for picking

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of the course students will

- Have knowledge of types of gears, gear trains and their applications
- Be able to design cams, tappets and cone drums used in the spinning machinery

- Be able to understand the design aspects of machine elements for specific requirements

TEXTBOOKS:

1. Booth J. E., "Textile Mathematics", Vol. 2&3, The Textile Institute, Manchester, 1975.
2. Slater K., "Textile Mechanics", Vol. 1&2, The Textile Institute, Manchester, 1977.

REFERENCE:

1. Rengasamy R. S., "Mechanics of Spinning Machines", NCUTE, Ministry of Textiles, Govt. of India, 2000.

TT6605 CHEMICAL PROCESSING OF TEXTILE MATERIALS - II L T P C
3 0 0 3

OBJECTIVE:

To enable the students to have knowledge about theory of coloration, and knit and garment processing

UNIT I COLOUR SCIENCE 9

Beer–Lambert's law, definitions of various terms associated with it and the mathematical representation, determination of concentration of dye in solution; Assessment of colour in textile substrates – colour order system, colour atlas, Munsell system, CIE colour system, tristimulus values, L,a,b values, psychometric colour parameters, whiteness and yellowness indices, colour difference, metamerism, K-M equation and its application in colour matching.

UNIT II THEORY OF DYEING 9

Stages in dyeing and their governing factors, equilibrium dye uptake, sorption isotherm and Nernst, Langmuir and Freundlich isotherms, definition of dye affinity and its mathematical derivation; rate of dyeing and half dyeing time.

UNIT III DYEING 9

Basic properties of dyes and pigments; classification of dyes and principle of application of various dyes; basic chemistry, properties, types and technology of application of direct, reactive, disperse, acid and basic dyes, after-treatments for these methods; processing of denims; determination of washing, light, rubbing and perspiration fastness properties.

UNIT IV PRINTING 9

Methods and styles of printing; manual screen printing, flat bed and rotary screen printing machines; constituents of printing paste and their roles; printing with direct, reactive, acid and disperse dyes; printing with pigments, environmental issues with pigment printing and alternatives.

UNIT V KNIT AND GARMENT PROCESSING 9

Tube slitting machine, tube reversing machine, need for dimensional stabilization of knits, various stages in dimensional stabilization of tubular and open width knits; advantages and limitations of garment dyeing, selection of garment accessories, garment dyeing machines, garment washing, various methods of garment printing.

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of the course the student will have knowledge on

- Colour, perception of colour
- Different class of dyes and ways of coloration

- Knit and garment processing
- Need of various finishes to the fabric.

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. Shore J., “Colourants and Auxiliaries: Volume II Auxiliaries”, Wood head Publishing Ltd., 2002.

REFERENCES:

1. Cegerra J. Puente P. And Valladepears J., “The Dyeing of Textile Materials”, Textile Institute, Manchester, 1993.
2. Chakraborty J. N. “Fundamentals and Practices in colouration of textiles’, Woodhead Publishing India Pvt Ltd, 2010.
3. Clark M. (Ed.) “Handbook of textile and industrial dyeing: Volume 1 Principles, Processes and Types of Dyes” Woodhead Publishing Ltd, 2011.
4. Parmar M S, Satsangi S S, Jai Prakash, "Denim - A Fabric For All (Dyeing . Weaving. Finishing)", NITRA, India, 1996.
5. Shah H. S. and , Gandhi R. S., “Instrumental Colour Measurement and Computer Aided Colour Matching for Textiles”, Mahajan Book Publication, 1990.
6. James Park and John Shore, “Practical Dyeing”, Society of Dyers and Colourists, 2004.
7. Shenai V. A., “Technology of Printing”, Sevak Publications, Mumbai, 1996.
8. Miles W. C., “Textile Printing”, Wood head Publication, 2003.

TT6606 GARMENT MANUFACTURING TECHNOLOGY L T P C
3 1 0 4

OBJECTIVES:

- To enable the students to understand the basics of garment manufacturing, pattern making & sewing and garment wet processing
- To expose the students to various problems & remedies during garment manufacturing & processing

UNIT I **9**

Anthropometry, mass-production, mass-customization; pattern making, grading, marker planning, spreading & cutting

UNIT II **9**

Different types of seams and stitches; single needle lock stitch machine - mechanism and accessories; needle – functions, special needles, needle size, numbering, needlepoint; sewing thread-construction, material, thread size, packages.

UNIT III **9**

Labels, linings, interlinings, wadding, lace, braid, elastic, hook and loop fastening, shoulder pads, eyelets and laces, zip fasteners, buttons

UNIT IV **9**

Raw material, in process and final inspection; needle cutting; sewability of fabrics; strength properties of apparel; dimensional changes in apparel due to laundering, dry-cleaning, steaming and pressing; care labeling of apparel

UNIT V **9**

Garment dyeing, printing and finishing; pressing categories and equipment, packing

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

OUTCOMES:

Upon completion of the course, the students will

- Know about pattern making, market planning, cutting and sewing of apparels
- Know about dyeing and finishing of garments

TEXTBOOKS:

1. Carr H., and Latham B., "The Technology of Clothing Manufacture", Blackwell Science Ltd., Oxford, 1994.
2. Gerry Cooklin, "Introduction to Clothing Manufacture" Blackwell Science Ltd., 1995.
3. Harrison.P.W Garment Dyeing, The Textile Institute Publication, Textile Progress, Vol .19 No.2,1988.

REFERENCES:

1. Winifred Aldrich., "Metric Pattern Cutting", Blackwell Science Ltd., Oxford, 1994
2. Peggal H., "The Complete Dress Maker", Marshall Caverdish, London, 1985
3. Jai Prakash and Gaur R.K., "Sewing Thread", NITRA, 1994
4. Ruth Glock, Grace I. Kunz, "Apparel Manufacturing", Dorling Kindersley Publishing Inc., New Jersey, 1995.
5. Pradip V.Mehta, "An Introduction to Quality Control for the Apparel Industry", J.S.N. Internationals, 1992.

TT6611 FABRIC QUALITY EVALUATION LABORATORY L T P C
0 0 3 2

OBJECTIVE:

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

LIST OF EXPERIMENTS

Determination of

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

TOTAL : 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

TT6612 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

TT6701 TOTAL QUALITY MANAGEMENT FOR TEXTILE INDUSTRY L T P C
3 0 0 3

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

UNIT I INTRODUCTION 9
Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of product and service quality - Basic concepts of TQM – TQM Framework - Contributions of Quality Gurus – Barriers to TQM – Cost of Quality.

UNIT II TQM PRINCIPLES 9
Quality statements - Customer focus –Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Continuous process improvement – PDCA cycle, 5S, Kaizen - Supplier partnership – Partnering, Supplier selection, Supplier Rating.

UNIT III TQM TOOLS & TECHNIQUES I 9
The seven traditional tools of quality – New management tools – Six-sigma: Concepts, methodology, applications to spinning, weaving, chemical processing and garment industries – Bench marking – Reason to bench mark, Bench marking process – FMEA – Stages, Types

UNIT IV TQM TOOLS & TECHNIQUES II 9
Quality circles – Quality Function Deployment (QFD) – Taguchi quality loss function – PM – Concepts, improvement needs – Performance measures – BPR; application of TQM tools in textile industry.

UNIT V QUALITY SYSTEMS 9

Need for ISO 9000- ISO 9000-2000 Quality System – Elements, Documentation, Quality auditing- QS 9000 – ISO 14000 – Concepts, Requirements and Benefits - Quality Council – Leadership, Employee involvement – Motivation, Empowerment, Team and Teamwork, Recognition and Reward.

TOTAL : 45 PERIODS

OUTCOMES:

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

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

TEXTBOOKS:

1. Dale H.Besterfiled, et al., "Total Quality Management", Pearson Education Asia, Third Edition, Indian Reprint , 2006.
2. Suganthi,L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006 .

REFERENCES:

1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", (6th Edition), South-Western (Thomson Learning), 2005.
2. Oakland, J.S. "TQM – Text with Cases", Butterworth – Heinemann Ltd., Oxford, Third Edition , 2003.
3. Janakiraman,B and Gopal, R.K, "Total Quality Management – Text and Cases",Prentice Hall (India) Pvt. Ltd., 2006.

TT6702 OPERATIONS RESEARCH FOR TEXTILE INDUSTRY L T P C
3 0 0 3

OBJECTIVES:

To enable the students to learn about

- Various operations research (OR) methods that can be applied in the textile industry
- Designing OR problem related to textile industry
- Method of solving OR problems

UNIT I **9**

Scope of operation research, applications, limitations; linear programming problems – construction, solutions by graphical method, simplex method, Big M method; sensitivity analysis; application of LP technique for mixing optimization in spinning mill

UNIT II **9**

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

UNIT III **9**

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

UNIT IV **9**

Game theory- two person zero sum games, solving by matrix method, graphical method; Decisions theory - decisions under assumed certainty, decision under risk, decision under uncertainty, illustrations from textile industry; inventory control - EOQ models-deterministic models –probabilistic models

UNIT V **9**

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

TOTAL : 45 PERIODS

OUTCOMES:

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

- Design operations research problems that can be applied to textile industry.
- Solve the OR problems

TEXTBOOKS:

1. Hamdy A Taha, "An Introduction to Operations Research, Prentice Hall, 8th Edition.
2. Panneerselvam R., "Operations Research", Prentice Hall of India, 2002.
3. Sharma J. K., "Operations Research: Theory and Applications", Macmillan, 1997.

REFERENCES:

1. Hillier and Lieberman, "Introduction to Operations Research", McGraw-Hill International Edition, Seventh Edition, 2001.
2. W.J. Fabrycky, P.M. Ghare & P.E. Torgersen, "Applied Operation Research and Management Science", Prentice Hall, New Jersey, 1984.
3. Tulsian P.C., "Quantitative Techniques Theory and Problems", Dorling Kindersley (India) Pvt. Ltd., 2006.
4. Ronald L. Rardin, "Optimization in Operations Research", Pearson Education, 1998.
5. Srivastava U.K., Shenoy G.V., Sharma S. C., "Quantitative Techniques for Managerial Decision", Second Edition, New Age International (P) Ltd., 2007.
6. Gupta P. K., Hira D.S., "Problems in Operations Research", S. Chand & Company, 2002
7. Mustafi C.K., "Operations Research: Methods and Practice", 3rd Edition, New Age International (P) Ltd., 2007

TT6703 **CLOTHING COMFORT** **L T P C**
3 0 0 3

OBJECTIVES:

To enable the students to learn about the

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

UNIT I **9**

Comfort – types and definition; human clothing system; Psychology and comfort - perception of comfort, psychological research techniques, comfort sensory descriptors, psychophysics, scales of measurement, scales to measure direct responses, wear trial technique**,** comfort perception and preferences.

UNIT II **9**

Thermo physiological comfort - clothing and thermal comfort; Thermal comfort - thermoregulatory mechanisms of the human body, two-node model of thermal regulation, dynamic thermal interaction between the body and clothing, role of clothing on thermal regulations.

UNIT III **9**

Heat and moisture transfer – wearer's temperature regulations, effect of physical properties of fibres, behavior of different types of fabrics, dynamic heat and moisture transfer in fabric, moisture exchange between fiber and air, boundary conditions, method of solution, moisture sorption of wool fabrics,

behavior of fabrics made from different fibers.

UNIT IV **9**

Psychological comfort - Transient temperature and moisture sensations, coolness to the touch, warmth, dampness, clamminess and moisture buffering during exercise, environmental buffering; 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; Garment fit and pressure comfort; predictability of clothing comfort performance - prediction of fabric hand, prediction of clothing thermophysiological comfort, predictability of sensory comfort, predictability of subjective preferences; application of clothing comfort research.

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

REFERENCE:

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

TT6704 **STRUCTURAL MECHANICS OF FABRICS** **L T P C**
2 0 0 2

OBJECTIVE:

To enable the students to learn about geometry of woven, knitted and nonwoven fabrics and understand the deformation of fabric under stress

UNIT I GEOMETRY OF CLOTH STRUCTURE **10**

Geometry of Plain and Non-Plain weaves; Peirce and Olofsson models; crimp ratio and thread spacing; Jamming of threads; Crimp interchange; Balance of crimp.

UNIT II FABRIC DEFORMATION **10**

Fabric deformation under tensile stress; prediction of modulus; tensile properties in bias direction; other fabric deformation – compression, shear, bending and buckling; fabric handle; Spirality and skewness formation and its control.

UNIT III KNITTED FABRIC STRUCTURES **5**

Geometry of weft and warp knitted structures, influence of friction on knit geometry; load extension of warp knit fabrics; biaxial stress behavior of plain-knit fabrics

UNIT IV NONWOVEN STRUCTURES **5**

Structure of felts; mechanical behavior of needle felts; structure of stitch bonded fabrics

TOTAL : 30 PERIODS

OUTCOMES:

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

- Models proposed for geometry of woven fabrics
- Characteristics of fabric on deformation
- Structural characteristics of knitted and nonwovens

and the student can design the fabric to get the desired property

TEXTBOOKS:

1. Hearle J. W. S., "Structural Mechanics of Fibers, Yarns and Fabrics", Wiley Interscience, New York, 1969.
2. Jinlian Hu., "Structure and Mechanics of Woven Fabrics", Woodhead Publishing Ltd., 2004.

REFERENCES:

1. Hearle J. W. S., John J., Thwaites. and Jafargholi Amirbayat., "Mechanics of Flexible Fibre Assemblies", Sijthoff and Noordhoff, 1980.
2. Hassan M. Berery., "Effect of Mechanical and Physical Properties on Fabrics Hand", Wood head publishing Ltd., 2005.

TT6705 STRUCTURAL MECHANICS OF YARNS L T P C
2 0 0 2

OBJECTIVE:

To enable the students to understand the fundamentals of the yarn structure, measures of structural parameters and factors influencing them.

UNIT I GEOMETRY OF TWISTED YARNS 6

Idealized helical yarn structure; yarn count and twist factors, twist contraction; Limits of twist.

UNIT II PACKING OF FIBERS IN YARNS 6

Idealized packing; measurement of packing density and radial packing density of yarn; Packing in actual yarns; Specific volume of yarns; measurement of yarn diameter.

UNIT III FIBRE MIGRATION 6

Ideal migration, tracer fiber technique, characterization of migration behavior, migration in spun yarns, mechanisms of migration, effect of various parameters on migration behavior.

UNIT IV MECHANICS OF CONTINUOUS FILAMENT YARNS 6

Analysis of tensile behavior; prediction of breakage; analysis of yarn modulus by energy method; observed extension and breakage of continuous filament yarns;

UNIT V MECHANICS OF STAPLE FIBRE YARNS 6

Theoretical analysis of tensile behaviour; deduction based on fiber obliquity and slippage; influence of fiber length, fineness and friction on tensile behaviour; strength prediction model for blended yarns.

TOTAL : 30 PERIODS

OUTCOMES:

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

- Ideal helical model of yarn and different structural parameters
- Method of measuring structural parameters
- Effect of different parameters affecting the structure of yarn
- Effect of structure of yarn on its properties

TEXTBOOKS:

1. Hearle J. W. S., "Structural Mechanics of Fibers, Yarns and Fabrics", Wiley-Interscience, New York, 1969.
2. Goswami B. C., "Textile Yarns: Technology, Structure and Applications", Wiley-Interscience, New York, 1977.

REFERENCE:

1. Hearle J. W. S., John J., Thwaites. and Jafargholi Amirbayat., "Mechanics of Flexible Fibre

Assemblies", Sijthoff and Noordhoff, 1980.

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

OBJECTIVE:

- 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, “Fundametals 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
2. www.nspe.org
3. www.globalethics.org
4. www.ethics.org

TT6001 HIGH PERFORMANCE FIBERS L T P C
3 0 0 3

OBJECTIVES:

To enable the students to learn about

- Various high performance fibres which are used for application as technical textiles
- Production of high performance fibres

UNIT I LINEAR POLYMER FIBRES 9

Introduction – linear polymer fibres; Aramid fibres - Polymer preparation, Spinning, Structure and properties and applications; Gel-spun high performance polyethylene fibres – Manufacture, Fibre characteristics, Properties, Yarn and fabric processing and applications; Other high modulus - high tenacity (HM-HT) fibres from linear polymers, melt-spun wholly aromatic polyester, PBO and related polymers, rigid-rod polymer, Russian aromatic fibres; Solid-state extrusion high-molecular weight polyethylene fibres

UNIT II CARBON FIBRE 9

Introduction – carbon fibres; different tyoes; PAN-based carbon fibres – manufacturing methods, properties and applications; Pitch-based carbon fibres - manufacturing methods, properties and applications; Rayon based carbon fibres - manufacturing methods, properties and applications; Vapour-grown carbon fibres; Carbon nanotubes - manufacturing methods, properties and applications.

UNIT III GLASS AND CERAMIC FIBRES 9

Introduction, types of glasses, properties and applications; Glass fibre production – batch process, continuous process; Fibre finish, Glass fibre properties, applications; glass fibre composites – manufacturing methods and applications. Introduction to ceramic fibrevs– types, manufacturing methods; Silicon carbide-based fibres – manufacturing methods, properties and applications. Other non-oxide fibres - Alumina based fibres; other polycrystalline oxide fibres; Single-crystal oxide fibres – properties and applications

UNIT IV CHEMICAL AND THERMAL RESISTANCE FIBRES 9

Chemical resistant fibres – Introduction; Chlorinated fibres – PVDC; Fluorinated fibres - PTFE, PVF, PVDF and FEP; Poly(etheretherketones): PEEK, Poly(phenylene sulphide), PPS, Poly(ether imide),

PEI – manufacturing methods, properties and applications; Thermal resistant fibres – Introduction, Thermosets, Aromatic polyamides and polyarimids - manufacturing methods, properties and applications; Semi-carbon fibres - oxidised acrylics, Polybenzimidazole(PBI), Polybenzoxazoles (PBO) - manufacturing methods, properties and applications.

UNIT V SPECIALITY FIBRES 9

Speciality fibres - Hollow and profile fibres - polymers used, method of manufacturing, properties and applications, advantages; blended and bi-component fibres – types; manufacturing process, properties and applications; super absorbent fibres – mechanism, method of manufacturing, applications; film fibres – raw materials, manufacturing techniques, properties and applications.

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of the course the students will have knowledge on

- Various high performance fibers and its polymers preparation
- Preparation and properties of carbon, glass, ceramic fibers and their application
- Hollow fibers and functional fibers

TEXTBOOKS:

1. Kothari V.K., "Textile Fibres: Development and Innovations", Progress in Textiles, Vol. 2, IAFL Publications, 2000
2. Hearle J.W.S., "High Performance Fibres", Wood head Publishing Ltd., Cambridge, England, 2001

REFERENCES:

1. Peebles L.H., "Carbon Fibres", CRC Press, London, 1995
2. Hongu T. and Phillips G.O., "New Fibres", Wood head Publishing Ltd., England, 1997

TT6002 CHARACTERISATION OF POLYMERS L T P C
3 0 0 3

OBJECTIVES:

To make students learn about

- Molecular architecture of the fibres and
- Characterization of fibres for thermal properties and structure.

UNIT I MOLECULAR WEIGHT 9

Polymer solution thermo dynamics; molecular weight and molecular dimensions by end group analysis, osmometry, light scattering, viscometry, gel permeation chromatography, high performance liquid chromatography

UNIT II MOLECULAR STRUCTURE CHARACTERISATION 9

Infrared spectroscopy- working principle, Sample preparation, Identification of polymers and additives, conformational studies, stereochemical studies, crystallinity and orientation measurement, end group analysis. NMR- working principle, types, sample preparation and applications of NMR in textiles, UV –visible Spectroscopy- working principle and applications in liquid and solid mode, raman spectroscopy and mass spectroscopy - Working principle and applications.

UNIT III THERMAL PROPERTIES 9

Thermal properties applied to polymers along with working principle and Instrumentation- differential scanning calorimetry, differential thermal analysis, thermo gravimetry, thermo-mechanical analyzer, dynamic mechanical and di-electric analysis.

UNIT IV CHROMATOGRAPHIC TECHNIQUES 9

Chromatographic techniques – adsorption chromatorgraphy – TLC, GC, LC – HPLC, GPC – hyphenated techniques with respect to theory, instrumentation and mode of separation. Applications pertaining to separation of organic compounds and estimation of them.

UNIT V OTHERS 9

Working principle, Instrumentation and Applications of Optical and electron microscopy, SEM, TEM: X-ray scattering from polymers- Working principle, calculation of cystallinity, orientation and crystal size in polymeric samples, birefregence measurement, crystallinity by density measurements.

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of this course the student will be able to

- Characterize the textile polymers for molecular weight, structural parameters and other important properties
- Interpret the results obtained from different instruments for characterizing the polymers

TEXTBOOKS:

1. Bill Mayer, "Textbooks of Polymer Science," 3rd ed., Wiley, 1984
2. Campell D. and White J.R, "Polymer characterization, Physical Techniques", McGraw – Hill, New York, 1969
3. Stamm M., "Polymer Surfaces and Interfaces", Springer1st Ed., 2008

REFERENCES:

1. Gupta V.B. and Kothari V.K., "Man Made Fibre Production," Chapman and Hall, 1985
2. Sperling, "Introduction to Physical Polymer Science," Wiley, 1986

GE6083 DISASTER MANAGEMENT L T P C
3 0 0 3

OBJECTIVES:

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

UNIT I INTRODUCTION TO DISASTERS 9

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

UNIT II APPROACHES TO DISASTER RISK REDUCTION (DRR) 9

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

UNIT III INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT 9

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios

in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT IV DISASTER RISK MANAGEMENT IN INDIA 9

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

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

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

TOTAL: 45 PERIODS

OUTCOMES:

The students will be able to

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

TEXTBOOKS:

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

REFERENCES

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

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

TT6004 **APPAREL PRODUCTION MACHINERY** **L T P C**
3 0 0 3

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 student will be able to understand the fundamental principles and working of garment production machinery and the interrelationship of assembly methods

TEXTBOOKS:

1. Harold Carr& Barbara latham, “The Technology of Clothing Manufacture”, Black well Sciences, 1996.
2. Jacob Solinger., “ Apparel Manufacturing Handbook “, VanNostrand Reinhold ompany 1980.

REFERENCE:

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

FT6606 APPAREL MARKETING AND MERCHANDISING L T P C

3 0 0 3

OBJECTIVES:

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

TEXT BOOKS:

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, Pearso.

TT6006 SUPPLY CHAIN MANAGEMENT FOR TEXTILE INDUSTRY L T P C
3 0 0 3

OBJECTIVES:

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

UNIT I 9

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

UNIT II **9**

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

UNIT III **9**

Distribution network and design for global textile and apparel products, models of distribution – facility location and allocation of capacity, uncertainty on design and network optimization; the role of transportation in supply chain, modes of transportation, characteristics of transportation, transport design options for global textile and apparel network, trade-off in transport design, risk management in transportation, transport decision in practice for textile and apparel industries.

UNIT IV **9**

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

UNIT V **9**

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

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of this course, the student shall have the

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

TEXTBOOKS:

1. Janat Shah, “Supply Chain Management – Text and Cases”, Pearson Education, 2009.
2. David Simchi-Levi, Philip Kaminsky, Edith Simchi-Levi, “Designing and Managing the Supply Chain: Concepts, Strategies, and Cases”, Tata McGraw-Hill, 2005.

REFERENCES:

1. Sunil Chopra and Peter Meindl, “Supply Chain Management-Strategy Planning and Operation”, PHI Learning / Pearson Education, 2007.
2. Altekar Rahul V, “Supply Chain Management-Concept and Cases”, PHI, 2005 Prentice Hall, NJ, 2005.

TT6007 **MEDICAL TEXTILES** **L T P C**
3 0 0 3

OBJECTIVES:

To enable the students to learn about

- Different types of biomaterials and
- Biomedical application of textile structures.

UNIT I **9**

Polymers and Textile-based techniques used for medical applications, Cell-Polymer interaction.

UNIT II **9**

Non-implantable materials: Wound-dressing, related hydrogel and composite products, Bandages,

Gauges, Implantable biomedical devices: Vascular grafts, Sutures, Heart valves.

UNIT III **9**

Extra-corporeal materials: Scaffolds for Tissue engineering, Rapid prototyping, Cartilages, Liver, Blood Vessel, Kidney, Urinary bladder, Tendons, Ligaments, Cornea,

UNIT IV **9**

Healthcare and hygiene products: Surgical Gowns, masks, wipes, Antibacterial Textiles, Super absorbent polymers.

UNIT V **9**

Safety, Legal and ethical issues involved in the medical textile materials

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of this course, the student shall know the

- Types of materials available for biomedical applications
- Functional requirements of textile structures for specific end uses and
- Selection and characterization of textile materials used for biomedical applications.

TEXTBOOKS:

1. Joon B. Park. and Joseph D. Bronzino., "Biomaterials – Principles and Applications", CRC Press Boca Raton London, NewYork, Washington, D.C. 2002
2. Allison Mathews and Martin Hardingham , "Medical and Hygiene Textile Production – A Hand Book", Intermediate Technology Publications, 1994
3. Anand S.C., Kennedy J.F. Miraftab M. and Rajendran S., "Medical Textiles and Biomaterials for Health Care", Wood head Publishing Ltd., 2006

REFERENCES:

1. Anand S., " Medical Textiles", Textile Institute, 1996.
2. Horrocks A.R. and Anand S.C., "Technical Textiles", Textile Institute, 1999.
3. Adanur S., "Wellington Sears Handbook of Industrial Textiles", Technomic Publishing Co. Inc., Lancaster Pennylvania, 1995.
4. Michael Szycher and Steven James Lee, "Modern Wound Dressing: A Systematic Approach to Wound Healing", Journal of Biomaterials Applications, 1992.

TT6008 **TEXTILE REINFORCED COMPOSITES** **L T P C**
3 0 0 3

OBJECTIVES:

To enable the students to learn about

- Reinforcements, matrices used for the composites
- Technique for making composites
- Manufacture and testing of composites and
- Application of composites

UNIT I INTRODUCTION **9**

Fiber reinforced polymers materials, properties; Resins - Thermoset and Thermo plastics / additives release agents; Composite material classification and its properties: Reinforcement – matrix interface wetability.

UNIT II PREPREGS AND PREFORMS **9**

Introduction -manufacturing techniques - property requirements - Textile preforms - weaving, knitting

and braiding. Geometrical Aspects: Fiber orientation, Volume fraction, weight fraction and voids.

UNIT III TECHNIQUES FOR MANUFACTURE OF COMPOSITES 13

Introduction - manufacturing processes – open mould process, closed mould process and continuous process. Metal matrix composites, Ceramic matrix composites - types-importance and processing.

UNIT IV MECHANICAL PROPERTIES OF TEXTILE COMPOSITES 9

Testing of Reinforced Plastics – Tensile, flexural, Impact, Interlaminar shear and compression properties.

UNIT V APPLICATION OF POLYMER COMPOSITES 5

Composites application in aerospace, construction industry, and sports products. electrical, Polymer composite for biomedical and vibration damping.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Select different types of textile reinforcements and matrices used for the manufacture of composites and their behaviours and
- Evaluate the characteristics of composites

TEXTBOOKS:

1. Leonard Hollaway, “Handbook of Polymer Composites for Engineering”, Wood head Publishing limited, 2007
2. Long A C, “Design and Manufacture of Textile Composites”, Wood head Publishing limited, 2005

REFERENCES:

1. White J R, and De S K, “Short Fiber-Polymer Composites”, Wood head Publishing limited, 1996
2. George Lubin, “Handbook of Fiberglass and Advanced Plastics Composites”, Van Nostrand Reinhold Company, New York, 1969

GE6084 HUMAN RIGHTS L T P C
3 0 0 3

OBJECTIVES :

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

UNIT I 9

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

UNIT II 9

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

UNIT III 9

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

UNIT IV 9

Human Rights in India – Constitutional Provisions / Guarantees.

UNIT V **9**

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

TOTAL : 45 PERIODS

OUTCOME :

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

REFERENCES:

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