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 chemistry 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 chemical processing applications
- 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 chemical processing
- 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 chemical processing industry.
- Build high moral character
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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

Listening - Introducing learners to GIE - Types of listening - Listening to audio (verbal & sounds); 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 - Reading comprehension exercises - Listening to audio files and answering questions.

UNIT II

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

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

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

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:**

**REFERENCES:**

**EXTENSIVE Reading (Not for Examination)**

**WEBSITES:**

**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

UNIT II SEQUENCES AND SERIES
9+3

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
UNIT V  MULTIPLE INTEGRALS

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:

REFERENCES:

PH6151 ENGINEERING PHYSICS – I

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

UNIT I  CRYSTAL PHYSICS
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

UNIT III  QUANTUM PHYSICS
one dimensional box - Electron microscope - Scanning electron microscope - Transmission electron microscope.

**UNIT IV ACOUSTICS AND ULTRASONICS**

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**

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

**REFERENCES:**
1. Searls and Zemansky. University Physics, 2009
5. Rajagopal K. Engineering Physics. PHI, New Delhi, 2011

**CY6151 ENGINEERING CHEMISTRY - I**

**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**

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
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

UNIT IV PHASE RULE AND ALLOYS

UNIT V NANO CHEMISTRY
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

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:

REFERENCES:
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

UNIT II C PROGRAMMING BASICS

UNIT III ARRAYS AND STRINGS

UNIT IV FUNCTIONS AND POINTERS

UNIT V STRUCTURES AND UNIONS
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.

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:

REFERENCES:
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)
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
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
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
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
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
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)
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:**

**REFERENCES:**

**Publication of Bureau of Indian Standards:**

**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**

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**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:
- Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

Plumbing Works:
- Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
- Study of pipe connections requirements for pumps and turbines.
- Preparation of plumbing line sketches for water supply and sewage works.
- Hands-on-exercise:
  Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.
- Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:
- Study of the joints in roofs, doors, windows and furniture.
- Hands-on-exercise:
  Wood work, joints by sawing, planing and cutting.
II MECHANICAL ENGINEERING PRACTICE

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
1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2. Fluorescent lamp wiring.
3. Stair case wiring
5. Measurement of energy using single phase energy meter.

IV ELECTRONICS ENGINEERING PRACTICE
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.
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:
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.
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.
5. Study purpose items: Telephone, FM radio, low-voltage power supply
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
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).
7. Conductometric titration of strong acid vs strong base.
OUTCOMES:
- The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters.

REFERENCES:

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

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
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
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
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
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
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:

REFERENCES:

EXTENSIVE Reading (Not for Examination)

Websites
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%
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
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
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

UNIT IV ANALYTIC FUNCTIONS
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, z², e^z and bilinear transformation.

UNIT V COMPLEX INTEGRATION
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:
REFERENCES:

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

UNIT II SEMICONDUCTING MATERIALS

UNIT III MAGNETIC AND SUPERCONDUCTING MATERIALS
Superconductivity: properties – Type I and Type II superconductors – BCS theory of superconductivity(Qualitative) - High Tc superconductors – Applications of superconductors – SQUID, cryotron, magnetic levitation.

UNIT IV DIELECTRIC MATERIALS

UNIT V ADVANCED ENGINEERING MATERIALS

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:

REFERENCES:

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

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 H₂ -O₂ fuel cell- applications.
UNIT IV ENGINEERING MATERIALS
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

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:

REFERENCES:

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
Operating Principles of Moving Coil and Moving Iron Instruments (Ammeters and Voltmeters), Dynamometer type Watt meters and Energy meters.
UNIT II    ELECTRICAL MECHANICS  12

UNIT III SEMICONDUCTOR DEVICES AND APPLICATIONS  12

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
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:

REFERENCES:
UNIT II EQUILIBRIUM OF RIGID BODIES
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

UNIT IV DYNAMICS OF PARTICLES

UNIT V FRICTION AND ELEMENTS OF RIGID BODY DYNAMICS
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.

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:

REFERENCES:
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,
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:

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

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 BaCl₂ and Na₂SO₄

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

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

UNIT II      TWO - DIMENSIONAL RANDOM VARIABLES
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
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
One way and Two way classifications - Completely randomized design – Randomized block design – Latin square design - \(2^2\) factorial design.

UNIT V      STATISTICAL QUALITY CONTROL
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:

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

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 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\textsubscript{2}, NO\textsubscript{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 /
UNIT IV  SOCIAL ISSUES AND THE ENVIRONMENT


Public awareness.

UNIT V  HUMAN POPULATION AND THE ENVIRONMENT


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:

REFERENCES:
To impart knowledge on various reaction mechanism, preparation of organic compounds and their properties. This will be a precursor for the study on Chemical Reaction Engineering.

UNIT I  ALIPHATIC HYDROCARBONS AND ALCOHOLS  9

UNIT II  ALDEHYDES, KETONES AND ACIDS  9

UNIT III  CARBOHYDRATES  9

UNIT IV  AROMATIC HYDROCARBON, AMINE AND DIAZONIUM SALT  9

UNIT V  DYED AND DYEING  9

TOTAL : 45 PERIODS

OUTCOMES:
At the end of this course, the student will be able to
- Identify what distinguishes a strong and weak nucleophile and recall the rules of reactions
- Analyzes a list of compounds and determines their reactivity.

TEXT BOOKS:

REFERENCES:

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

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

UNIT III  CHARACTERIZATION OF POLYMERS
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

UNIT V  POLYMER PROCESSING AND REUSE OF POLYMERS

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:

REFERENCES:
- To familiarize the fine, chemical and morphological structure of various fibres through discussion
- To enable the students to know about moisture behaviour, mechanical, electrical, optical and thermal properties of various fibres

UNIT I STRUCTURE OF FIBRES
Classification of Textile Fibres based on origin and chemical nature – Basic requirements for fibre formation. Physical and chemical properties of natural and man-made textile fibres – cotton, viscose, acetate, polyester, polyamide, polycrylonitrile, polyethylene, polypropylene and bast fibres., physical and chemical properties and applications of unconventional fibers- tencel/lyocell, modal, soya, bamboo, sisal, banana, ingeo ,olefin, hollow fibers, aramid,..

UNIT II INVESTIGATION OF FIBRE STRUCTURE

UNIT III MOISTURE ABSORPTION PROPERTIES OF FIBRES

UNIT IV MECHANICAL PROPERTIES OF FIBRES

UNIT V OPTICAL, FRICTIONAL, ELECTRICAL AND THERMAL PROPERTIES

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to
- Identify the fibres based on their chemical and morphological structures
- Understand the properties of different textile fibres

TEXTBOOKS:
REFERENCES:

TC6302 TECHNOLOGY OF YARN MANUFACTURE

OBJECTIVES:
- To expose the students to the numbering system used to specify textile yarns
- To enable the students to understand the processes involved in the production of yarn from fibres
- To enable the students to understand the machinery used for the production of yarns using short staple spinning system

UNIT I GINNING AND BLOWROOM

UNIT II CARDING AND DRAWFRAME

UNIT III COMBER AND SPEEDFRAME

UNIT IV RING FRAME

UNIT V OTHER SPINNING SYSTEMS
Principles of yarn manufacture, yarn characteristics and applications of Rotor Spinning, Friction Spinning, Air-jet spinning, Wrap spinning, Core yarn spinning and Self-twist spinning, Twistless spinning.

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

OUTCOMES:
Upon completion of the course, the students will be able to
- Calculate the yarn numbering by different systems
- Understand the processes involved in the production of yarn using short staple spinning system
- Understand the details of machinery used for the production of yarn

TEXT BOOKS:

REFERENCES:

TC6311 TEXTILE CHEMICALS ANALYSIS LABORATORY

OBJECTIVES:
To practice the students in evaluation of chemicals and dyes used in textile wet processing industry

LIST OF EXPERIMENTS
1. Estimation of the Efficiency of the wetting agent.
2. Evaluation of the oxidizing agent.
3. Evaluation of the reducing agent.
4. Evaluation of the dispersing agent.
6. Analysis of oils.
7. Evaluation of the inorganic substances in Textile processing.
8. Identification of dye powder.
9. Identification of the dye in the dyed fabric
10. Estimation of percentage purity of the dye solution.
11. Evaluation of the finishing chemicals

TOTAL : 45 PERIODS

OUTCOMES:
On completion of this course, the students would be able to estimate different types of chemicals used for wet processing of textile materials. They would also be able to identify the dyes and estimate purity of dye solution.

LIST OF EQUIPMENTS FOR BATCH OF 30 STUDENTS
1. Beaker Dyeing machine – 1 No.
2. Dye Bath – 1 No.
3. Weighing Balance – 1 No.
4. Stop Watch – 1 No.
5. Soxhlet Apparatus – 1 No.
7. Glassware – Required quantity

TC6312  FIBRE ANALYTICAL LABORATORY  L T P C
0 0 3 2

OBJECTIVES:
To practice the students to
• Identify textile fibres by different tests and
• Measure important properties of fibres

LIST OF EXPERIMENTS
1. Identification of longitudinal & cross sectional view of cellulosic fibers
2. Identification of longitudinal & cross sectional view of Protein fibers
3. Identification of longitudinal & cross sectional view of Synthetic fibers
4. Identification of burning behavior of Cellulosic fibres
5. Identification of burning behavior of Protein fibers
6. Identification of burning behavior of Synthetic fibers
7. Determination of Moisture Regain of Cellulosic fibres
8. Determination of Moisture Regain of Protein fibres
9. Determination of Moisture Regain of Synthetic fibres
10. Determination of Density of Fibres
11. Identification of Cellulosic fibre by Staining Test
12. Identification of Protein fibre by Staining Test
13. Identification of Synthetic fibre by Staining Test
14. Identification of Cellulosic fibres by solvent method
15. Identification of Protein fibres by solvent method
16. Identification of Synthetic fibres by solvent method

TOTAL: 45 PERIODS

OUTCOMES:
On completion of this practical course, the students would be able to
• Identify different types of textile fibres based on structure, density, staining, burning and
dissolution in solvents
• Measure the moisture regain property of textile fibres

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS
1. Weighing Balance – 1 No.
2. Projection Microscope – 1 No.
3. Conditioning Oven – 1 No.
4. Moisture Meter – 1 No.
5. Density Gradient column – 1 No.
7. Stain Tester – 1 No.
8. Glass ware – Required quantity
OBJECTIVES:
To enable learners to,

- Develop their communicative competence in English with specific reference to speaking and listening
- Enhance their ability to communicate effectively in interviews.
- Strengthen their prospects of success in competitive examinations.

UNIT I LISTENING AND SPEAKING SKILLS
12
Conversational skills (formal and informal)- group discussion- making effective presentations using computers, listening/watching interviews conversations, documentaries. Listening to lectures, discussions from TV/ Radio/ Podcast.

UNIT II READING AND WRITING SKILLS
12
Reading different genres of tests ranging from newspapers to creative writing. Writing job applications- cover letter- resume- emails- letters- memos- reports. Writing abstracts- summaries- interpreting visual texts.

UNIT III ENGLISH FOR NATIONAL AND INTERNATIONAL EXAMINATIONS AND PLACEMENTS
12
International English Language Testing System (IELTS) - Test of English as a Foreign Language (TOEFL) - Civil Service (Language related)- Verbal Ability.

UNIT IV INTERVIEW SKILLS
12
Different types of Interview format- answering questions- offering information- mock interviews-body language (paralinguistic features)- articulation of sounds- intonation.

UNIT V SOFT SKILLS
12
Motivation - emotional intelligence- Multiple intelligences- emotional intelligence- managing changes-time management-stress management-leadership straits-team work- career planning - intercultural communication- creative and critical thinking

TOTAL: 60 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.

Lab Infrastructure:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Description of Equipment (minimum configuration)</th>
<th>Qty Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Server</td>
<td>1 No.</td>
</tr>
<tr>
<td></td>
<td>• PIV System</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 1 GB RAM / 40 GB HDD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• OS: Win 2000 server</td>
<td></td>
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<tr>
<td></td>
<td>• Audio card with headphones</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• JRE 1.3</td>
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</tr>
</tbody>
</table>
### 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 on Internal and External Evaluation:**

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, and case studies.

### OUTCOMES:

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

- Take international examination such as IELTS and TOEFL
- Make presentations and Participate in Group Discussions.
- Successfully answer questions in interviews.

### REFERENCES:

2. **Graded Examinations in Spoken English and Spoken English for Work** downloadable materials from Trinity College, London.
4. Interactive Multimedia Programs on **Managing Time and Stress**.
5. **Personality Development** (CD-ROM), Times Multimedia, Mumbai.
OBJECTIVE:
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

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

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

OUTCOME:
It helps the students to 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.
TC6401 CHEMISTRY AND TECHNOLOGY OF INTERMEDIATES AND DYES

OBJECTIVES

- To enable the students to learn about the raw materials & purification of intermediates for dyes preparation
- To explain the students about the basic chemistry & mechanism in dye & dye intermediates preparation

UNIT I INTRODUCTION TO DYES
Coal tar – fractional distillation and their products. Aromatic hydrocarbons from petroleum. Introduction to primary and intermediate chemicals for dyes. Relation between Colour and Chemical Constitution.. CI Name and Number.

UNIT II UNIT PROCESSES
Unit processes in organic synthesis such as halogenation, nitration, Sulphonation, esterification, alkylation ,acetylation, hydroxylation, and diazotisation with suitable examples.

UNIT III AROMATIC INTERMEDIATES
Systematic study of important intermediates from benzene, chlorobenzene, toluene, nitrobenzene, aniline, phenol, salicylic acid, naphthalene and anthraquinone.

UNIT IV DYE INTERMEDIATES
Classification of dyes and intermediates. Introduction to azines, oxazines, thiazines, xanthine, acridine, Diphenyl and triphenyl methane dyes.

UNIT V DYES
Introduction to their chemistry and preparation of – Anthraquinone vat dyes, indigoid, solubilised vat dyes, reactive dyes, disperse dyes, Blueing and Fluorescent brightening agents.

OUTCOME:
Upon completion of the course, the students will be able to
- Understand about the dyes and their intermediates which is an integral backbone of textile wet processing industry

TOTAL : 45 PERIODS

TEXTBOOKS:
TC6402 PREPARATION OF TEXTILES FOR COLORATION

OBJECTIVE:
- To facilitate the students to learn about the pre-treatments of various kinds of textile materials involved in textile wet processing industries.

UNIT I SINGEING & DESIZING

UNIT II MERCERISATION

UNIT III SCOURING

UNIT IV BLEACHING

UNIT V DEVELOPMENTS
Developments in grey preparation – combined processing enzymatic scouring & bleaching, cold bleaching; prograde process (liquid ammonia mercerization) Developments in desizing, Scouring, Bleaching and mercerizing, plasma based preparation, ozone bleaching.

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to
- Design wet processing techniques such as singeing, desizing, mercerizing, scouring and bleaching of different textile materials at desired levels.
- Understand the process control of pre treatment processes

**TEXTBOOKS:**
3. Charles Tomasno, Chemistry and Technology of fabric Preparation and Finishing, North Carolina State University, USA,1992

**REFERENCES:**

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**TC6403**

**PRINCIPLES & THEORY OF DYEING**

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**OBJECTIVES**
- To expose the students about the mechanics of dyeing
- To enable the students to learn about colour, combinations of colours, their source and measurement
- To expose the students to the factors influencing the dyeing

**UNIT I**

**CHEMICAL KINETICS**


**UNIT II**

**ADSORPTION AND CATALYSIS**


**UNIT III**

**ELECTROCHEMISTRY**


**UNIT IV**

**FIBER PROPERTIES AND ITS EFFECT ON DYEING**

UNIT V  FACTORS INFLUENCING DYEING


OUTCOMES:
Upon completion of the course, the students will be able to
- Explain the mechanics of dying
- Explain the factors influencing dyeing
- Work in the dye houses of textile processing industry

TEXTBOOKS:

REFERENCES:

TC6404  PHYSICAL TESTING OF TEXTILE MATERIALS  L T P C
3 0 0 3

OBJECTIVES:
- To enable the students to understand the principles of equipments used for testing of textile fibres, yarns and fabrics
- To enable the students to understand the method of testing of textile fibres, yarns and fabrics
- To expose the students the method of applying statistical techniques for interpreting the data

UNIT I  INTRODUCTION

UNIT II  STATISTICAL EVALUATION

UNIT III  FIBRE TESTS
UNIT IV  YARN TESTS  9

UNIT V  FABRIC TESTS  9

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to
- Explain the method of testing textile fibres, yarns and fabrics
- Analyze and interpret the results from testing equipments
- Apply statistical techniques for analyzing the test results.

TEXTBOOKS:

REFERENCES:

TC6405  TECHNOLOGY OF FABRIC MANUFACTURE  L T P C
3 1 0 4

OBJECTIVES:
The main objective of this course is to enable the students to understand
- Preparatory processes involved in the production of fabric
- Basics of weaving and knitting processes
- Basics of nonwoven production methods

UNIT I  PREPARATION OF YARNS FOR WEAVING AND KNITTING  9

UNIT II  PLAIN POWER LOOM  9
Types of looms - Primary, secondary and auxilliary mechanisms of loom, - Classification of weaving machines. Shedding - Tappet shedding, Shuttle Picking mechanism – Beat-up mechanism. Stop motions – Friction Let – off motion - Negative let off and positive let off motions. Take-up motion - Five wheel take up motion, Seven wheel take up motion, Positive continuous take up motion. Warp
protection Mechanisms - Loose Reed and Fast Reed Mechanisms, Warp Stop Motions, Weft stop motions, temples, lease rods and brake. Weaving faults. Brief study about drop box loom and Terry loom.

UNIT III DOBBY AND JACQUARD SHEDDING 9

UNIT IV SHUTTLELESS WEAVING 9

UNIT V BONDED FABRICS & KNITTING 9

TOTAL : 60 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to
- Explain the preparatory processes involved in the production of fabrics
- Explain the principles of different fabric production methods
- Identify various fabric defects and their causes and remedies

TEXT BOOKS:

REFERENCES:

TC6411 WET PROCESSING PREPARATION LABORATORY L T P C 0 0 3 2

OBJECTIVE:
To practice the students in the tests carried out at preparatory section of the wet processing of textile materials

LIST OF EXPERIMENTS
1. Determination of starch content in Enzyme desizing.
2. Determination of residual starch in acid desizing
3. Determination of scouring loss.
5. Comparison between bleached and bleached & optical brightened treated sample for whiteness and reflectance value.
6. Determination of the yellowing of hypochlorite bleached (soured/not soured, but washed) fabrics.
7. Effect of time/ temperature in bleaching with hypochlorite (whiteness and strength loss).
8. Effect of pH/ available chlorine in bleaching with hypochlorite (whiteness and strength loss)
9. Scouring & Bleaching of knitted cotton fabrics in winch
10. Scouring & Bleaching of woven blend fabrics in jigger.
12. Degumming & Bleaching of silk.
13. Scouring and Bleaching of wool using hydrogen peroxide.

OUTCOMES:
Upon completion of this practical course, the students would be able to
- Determine the contents of chemicals
- Efficiency of different processes of wet processing preparatory
- Carryout scouring and bleaching of different textile materials

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS
1. Jigger – 1 No.
2. Winch – 1 No.
3. Water Bath with heating facility – 1 No.
4. Tensile Strength Tester – 1 No.
5. Computer colour Matching system – 1 No.
6. pH Meter – 1 No.
7. Weighing balance – 1 No.

TOTAL : 45 PERIODS

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

LIST OF EXPERIMENTS
1. Measurement of Fibre Length
2. Measurement of Fibre Fineness
3. Determination of yarn count from fabric sample by basely balance
4. Measurement of a) Linear density of sliver, roving and yarn. b) Single yarn and ply yarn
   twist.
8. Measurement of a) Fabric Tensile Strength. b) Fabric Bursting strength
10. Determination of GSM
11. Determination of twist

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of this practical course, the students would be able to
- Measure length and fineness of fibres
- Measure linear density, twist and strength of yarn and
• Measure thickness, stiffness, crease recovery and strength of fabrics using instruments.

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS
1. GSM Cutter
2. Crimp Tester
3. Thickness gauge
4. Electronic Twist tester
5. Lea strength Tester
6. Stiffness Tester
7. Crease recovery tester
8. Baer sorter
9. Bursting strength tester
10. Tear strength tester
11. Fibre Fineness Tester
12. Projection microscope
13. Wrap Block
14. Wrap Reel
15. Tensile Strength Tester
16. Single Yarn Strength Tester
17. Conditioning oven
18. Stelometer
19. Trash separator
20. Yarn appearance board winder
21. Drape meter
22. Abrasion resistance tester
23. Crock meter
24. Pilling Tester
(Each one number)

TC6413 YARN AND FABRIC MANUFACTURING LABORATORY L T P C 0 0 3 2

OBJECTIVES:
To expose the students to the
• Machinery used for production of yarn from fibres and
• Weaving preparatory machines and looms

LIST OF EXPERIMENTS

YARN MANUFACTURE
1. Sketching the various parts of blow room indicating the passage of material giving the settings and speeds.
2. Sketching the various parts of card indicating the passage of material giving the settings and speeds
3. Drawing the passage of material through a draw frame and give the settings and speeds.
4. Give the passage of material through the combing with settings and speeds.
5. Draw the passage of material through the combing frame and give the settings and speeds. Also sketch the building mechanism of simplex.
6. Study the construction details of ring frame and give the settings and speeds. Also sketch the builder motion mechanism of ring frame.
FABRIC MANUFACTURE
7. Drawing the passage of material through a cone winding machine and give the settings and speeds.
8. Assembling and setting to time the dismantled parts of the shedding mechanism.
9. Assembling and setting to time the dismantled parts of cone over pick mechanism or side lever under pick mechanism.
10. Assembling and setting to time the dismantled parts of beat-up mechanism.
11. Assembling and setting to time the dismantled parts of 7 wheel take-up motion.
12. Assembling and setting to time the dismantled parts of Negative let-off mechanism.

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of this practical course, the students would be able to
- Explain the construction of machines used for the production of yarns and
- Explain the different mechanisms of looms

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS
1. Miniature Blow room Line
2. Carding
3. Draw Frame
4. Comber
5. Speed Frame
6. Ring Frame
7. Cone / Cheese winding Machine
8. Automatic loom with all mechanisms related to the practical works mentioned
   (Each one machine)

TC6501 CHEMISTRY OF TEXTILE AUXILIARIES

OBJECTIVES:
- To provide the knowledge on classification and types of textile auxiliaries
- To provide the knowledge on importance and basic functions of textile auxiliaries
- To enable the students to know about the chemistry of textile auxiliaries

UNIT I
Auxiliaries: Importance and functions; Surfactants: Mode of action and classification of surfactants – cationic, anionic, nonionic and amphoteric surfactants.

UNIT II
Auxiliaries associated with De-sizing, scouring, Bleaching of cellulosic fibres, Protein fibres and synthetic fibres.

UNIT III
Auxiliaries associated with Dyeing with Direct Dyes, Reactive, Vat, Azoic colors, Sulphur dyes, Acid dyes, Metal complex dyes, Basic and Disperse dyes.

UNIT IV
Auxiliaries associated with printing: Direct Style of Printing, Discharge style of Printing, Resist style of printing.
UNIT V
Auxiliaries used in Resin Finishing, Stiff finishing, soft finishing, Water repellent, Water Proof, Flame retardant, Soil release.

TOTAL : 45 PERIODS

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

- Understand about the textile auxiliaries which would enable the student to work in the textile auxiliaries manufacturing companies.
- Perform research and development in the field of textile auxiliaries.

TEXTBOOKS:

REFERENCE:

TC6502 WET PROCESSING MACHINERY

OBJECTIVES:
To enable to students to learn about the

- Working principles of wet processing machineries
- Operations of machines and its maintenance schedules
and expose the students to the latest machineries used for wet processing.

UNIT I FIBRE AND YARN PROCESSING

UNIT II FABRIC PROCESSING

UNIT III PRINTING MACHINES AND DRYERS
UNIT IV  FINISHING MACHINES AND WASHERS  9

UNIT V  HOSIERY AND GARMENT PROCESSING  9

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of the course, the students would
- Know various machinery used in yarn and fabric dyeing
- Know various machinery used for printing and finishing of fabrics which would help them in working in dyeing and printing industry

TEXTBOOKS:

REFERENCES:

TC6503  DYEING OF TEXTILE MATERIALS– I  L T P C
3 0 0 3

OBJECTIVES:
- To provide the knowledge on theory of dyeing of cellulosic fibrous material
- To provide the knowledge on classification, principle, shop floor practice & problems in the application of various dyes on cellulosic textiles
- To enable the students to understand machinery used for dyeing of cellulosic textile materials through class room discussion and field visits.

UNIT I  9
Basic concept of dye and pigment, Definition of affinity, substantivity, reactivity, exhaustion, depth of dyeing, percentage shade. Concepts of exhaust and padding techniques of dyeing. Basic mechanisms of dyeing techniques such as mechanical deposition, chemical fixation. Classification of dyes according to methods of application. Influence of pretreatment on dyeing properties.
UNIT II
Direct dyes: General properties, principles and method of application on cellulosic materials. Classification dyeing of cellulosic materials. Various after treatments to improve the wash fastness and light fastness. Practical problems and their remedies. Reactive dyes – Chemistry, concept of hot brand, cold brand, HE and vinyl sulphone reactive dyes, bifunctional and low salt reactive dyes, principle steps involved in dyeing of cellulosic materials. Practical problems remedy

UNIT III
Dyeing of Indigo (synthetic indigo. Dyeing of cellulose materials with phthalogen blue, mineral khaki, aniline black, pigments. Azoic colours – Chemistry and general properties of Azoic colours – Concept of napthols and bases.

UNIT IV

UNIT V

TOTAL : 45 PERIODS

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

- Dye the cellulosic textiles with different dyes
- Perform research and development in the field of dyeing of cellulosic textiles

TEXTBOOKS:

REFERENCES:

TC6504 TECHNOLOGY OF PRINTING – I L T P C 3 0 0 3
OBJECTIVE:
To enable the students to understand the fundamental concepts of printing of various kinds of fabrics using different colourants

UNIT I
Definition of printing – Difference between printing and dying – Pretreatment and Fabric requirements for printing – Design details of printing like repeat of design, squeegees, bolting cloth, Preparation of Screen – Table and Rotary machine – Ingredients in printing with functions and their concentration of usage.
UNIT II

UNIT III
Printing with reactive dyes by steaming method, curing and silicate padding method – Advantages and Disadvantages of above methods– Printing with Rapid fast and Rapidogen colours, Printing with solubilised Vat dyes. IKAT Printing

UNIT IV
Colour and White Discharge of cotton and viscose dyed materials – Problems associated with Discharge style printing. Brief study on Discharging agents and their usage and limitations of usage, Different styles of Resist printing of cellulose materials, conversion style of discharge printing

UNIT V
Printing paste formulations, printing of silk with various classes for dyes. Direct, discharge and resist styles of printing. Print paste formulations. Direct, discharge and resist styles of printing on woolen materials.

OUTCOMES:
Upon completion of the course, the students will be able to
- Understand the concepts of printing of fabrics
- Contribute more trends and new developments to the printing industry

TEXTBOOKS:

REFERENCES:

OBJECTIVES:
- To enable the students to understand various colour theories
- To simulate shade matching and predict recipes using CCM
- To discuss more about responsibilities of each department in garment industry and their working procedure

UNIT I
Colour perception, theories of colour vision, colour measurement. Reflectance Spectrophotometer--Basic components of Reflectance Spectrophotometer-TYPES of Spectrophotometer-Spectrophotometer performance Parameter-Spectrophotometer selection parameter-precautions for Spectrophotometer-Calibration of spectrophotometer-main features of morden spectrophotometer-New commercial spectrophotometer--Tristimulus colorimeters-Gloss meters-multi-angle spectrophotometer-Features of commercial multi-angle spectrophotometer-commercial
UNIT II

UNIT III
Sample preparation, presentation & measurement – Selection of spectrophotometer - Sample preparation & presentation – Textiles & dye application .The basic laboratory equipments for successful handling of computer color matching system – The CIE color specifications in textiles applications - The CIE color specifications of dyes – Change in Hue with increase in concentration – Chromaticity coordinates & chromaticity diagram – Dye gamut mapping – Setting tolerances – Studying the compatibility of dyes – Color difference assessment – Color difference of self colors – colour difference using different color difference equations.

UNIT IV

UNIT V

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to
- Understand colour theories, different measures of colour and specifications
- Predict recipes using CCM which would enable them to provide job opportunity in the field of testing and to carry out research.
TEXTBOOKS:

REFERENCES:
2. Colour Technology Tools, Techniques & Applications

TC6506  DYEING OF SYNTHETIC TEXTILES  L T P C
3 0 0 3

OBJECTIVES:
To enable the students to
- Understand the colouration of synthetic textiles in the field of mass colouration and dyeing
- Solve the shop floor problems in the colouration process
and to expose the students to the latest developments in colouration of synthetic textiles

UNIT I
Mass Colouration of Polyester, Nylon, Acrylic and polypropylene, Advantages & Disadvantages of Mass Colouration; Difference between Mass Colouration and Dyeing.

UNIT II
Polyester Dyeing: carrier, HTHP and thermosol methods of dyeing. CD polyester dyeing, micro denier PET dyeimg. Practical problems and their solutions. Stripping of dyed PET

UNIT III

UNIT IV

UNIT V

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to
- Understand the colouration of synthetic fibres and solving problems related to the process
- Perform research and development work in the field of colouration of synthetic textiles
TEXTBOOKS:

REFERENCES:

TC6511 DYEING OF SYNTHETIC TEXTILE LABORATORY L T P C
0 0 3 2

OBJECTIVE:
To practice the students in dyeing of synthetic textile materials

LIST OF EXPERIMENTS
1. Effect of water hardness & pH in dyeing of polyester with disperse dyes.
2. Dyeing of Polyester using carriers.
3. Dyeing of Polyester by HTHP methods.
5. Exhaust dyeing of Polyester/Cotton blended fabrics with disperse/reactive system.
7. Dyeing of Polyester/Cotton blended fabrics with pigments
8. Exhaust dyeing of Polyester/Viscose blended fabrics with disperse/reactive system.
10. Dyeing of Polyester/Wool blended fabrics using disperse/acid system.
11. Dyeing of Polyester/Wool blended fabrics using disperse/basic system.
14. Matching of shades with the help of computer colour matching system.
15. Dyeing of acrylic fibre with cationic dyes.
16. Dyeing of Nylon fabrics

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of this practical course, the students would be able to
- Dye polyester and blends of polyester with different dyes
- Dye Nylon, acrylic and other synthetic fibres
- Match the shades with the help of computer colour matching system

LIST OF EQUIPMENTS FOR BATCH OF 30 STUDENTS
1. Beaker Dyeing machine
2. Water Bath with heating facility
3. Weighing Balance
4. Hardness Meter
5. pH Meter
6. Jigger
7. Padding mangle
8. Computer color matching system
9. Winch
10. HTHP Soft flow dyeing machine
(Each one machine)
OBJECTIVE:
To practice the students in shade matching and testing of dyed fabrics for fastness properties.

SHADE MATCHING

LIST OF EXPERIMENTS
1. Self shade card preparation with direct dyes.
2. Self shade card preparation with Reactive Cold Brand dyes.
5. Preparation of compound shades using binary colours of Reactive Hot Brand Dyes.
10. Correction recipe prediction from computer colour matching.
11. Measurement of delta-E.

QUALITY CONTROL

LIST OF EXPERIMENTS
2. Determination of different whiteness indices, yellowing indices of the bleached fabric.
3. Wash fastness of dyed/printed samples.
4. Light fastness of dyed/printed samples.
5. Rubbing fastness of dyed/printed samples.
6. Perspiration fastness of dyed/printed samples.
7. Chlorine fastness of dyed/printed samples.(Spot Test)

OUTCOMES:
Upon completion of this practical course, the students would be able to:
- Prepare shade cards and carry out shade matching.
- Determine the efficiency of scouring and bleaching.
- Measure fastness properties of dyed and printed fabrics.

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS
2. Laundrometer – 1No.
3. Light Fastness Tester – 1No.
4. Crock meter – 1No.
5. Perspirometer – 1No.
6. Incubator – 1No.
7. Water Bath – 1No.
8. Weighing Balance – 1No.
9. Grey scales
10. Conical flasks

TOTAL: 45 PERIODS
OBJECTIVE:
To practice the students in dyeing and printing of textile fabrics using different dyes

LIST OF EXPERIMENTS
7. Stripping and Redyeing of Faulty dyeing (Reactive)
10. Direct style of printing using hot brand reactive dyes.
11. Direct style of printing using Vinyl Sulphone dyes,
12. Direct style of printing using Pigment Dyes on cotton and P/C Blend.
14. Direct style of printing with Khadi on Hosiery.
15. Silver print on hosiery fabrics.
16. Gold print on hosiery fabrics

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of this practical course, the students would be able to
- Dye cotton fabrics using different dyes
- Demonstrate the effect of different parameters on dyeing
- Print woven and knitted fabrics using different dyes

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS
1. Padding mangle
2. Winch
3. Jigger
4. Water Bath
5. Weighing Balance
6. Thermometer
7. Stop watch
8. pH Meter
9. Table Screen printing
10. Hot air oven
11. Curing Chamber
12. Lab Steamer
13. Hand Dryer
14. Mechanical Stirrer
15. Garment Printing Machine
   (Each one machine)
OBJECTIVES:
- To familiarize the students with the properties and application of various finishing agents on various textile materials through discussion, experimentation and observation.
- To enable the students to understand to solve the shop floor problems in the finishing
- To enable the students to understand different types of finishes required for different classes of textile materials of finishing and machines used for finishing through discussion and field visits.

UNIT I

UNIT II
Concept of Flame proof & flame retardancy. Concept of pyrolysis, Flame retardant finishes for cotton, Concept of waterproof and water repellent Finishes, Durable & Semi durable and Temporary finishes, Antimicrobial finish - Evaluation of anti microbial finish, Elastomeric finishes and Evaluation

UNIT III

UNIT IV

UNIT V
Brief study about stiffening and softening of textile materials, Mechanism in the weight reduction of PET by using alkali Micro encapsulation techniques in finishing process, Nano finish, Self cleaning finish. Brief study about Plasma Treatment. Study about Bio finishing

OUTCOMES:
Upon completion of the course, the students would
- Know about the process of finishing of textile goods
- Understand the principle and method of application of various types of special finishes on textile fabrics

TEXTBOOKS:
1. V.A.Shennai, Technology of Finishing, Vol X, Sevak Publications, Mumbai

REFERENCES:
1. Microencapsulation in finishing, Review of progress of Colouration, SDC, 2001
OBJECTIVES:

- To provide knowledge on theory dyeing of protein fibrous material
- To provide the knowledge on classification, principle, shop floor practice & problems in the application of various dyes on protein textiles
- To make the students understand the machines used for dyeing the protein textile materials through discussion and field visits.

UNIT I

UNIT II

UNIT III
Reactive Dyes: Types of reactive dyes used for dyeing protein fibres – Type of chemical reactions involved in dyeing of wool and silk with reactive dyes – application of monochloro, dichloro triazine dyes on wool and silk – application of vinyl sulphone, difluoro, mono chloro primidyl dyes, bromo acrylamide dyes and bifunctional dyes on wool and silk. Striping and redyeing.

UNIT IV

UNIT V

TOTAL : 45 PERIODS

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

- Dye protein textiles using different types of dyes
- Perform research and development work in the field of dyeing of protein textiles
TEXTBOOKS:

REFERENCES:

TC6603 TECHNOLOGY OF PRINTING- II L T P C 3 0 0 3

OBJECTIVE:
To enable the students to understand the fundamental concepts of printing of various kinds of fabrics using different colourants

UNIT I
Printing paste formulation, selection criteria of dyes, Direct, Discharge and Resist styles of printing. Fixation and after treatments. Pigment printing of PET and blends. speckle printing,

UNIT II
Printing paste formulation, printing of polyamide with acid, disperse, metal complex dyes. Printing of acrylics with disperse and cationic dyes. Direct, discharge and resist styles of printing.

UNIT III

UNIT IV
Preparation of knits and garments for printing, Khadi print, Plastic and Rubber print, Gold and Silver Prints on Hosiery by direct style method – Flock printing on Hosiery. Tie and Dye style, Batik printing, Crepon style of printing

UNIT V
Introduction of transfer printing, sublimation transfer, melt transfer, film release, wet transfer printing. Methods used for transfer printing, machines used for transfer printing. Garment Printing - Various techniques and machineries of printing of garments.

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to
- Understand printing of polyester, polyamides and blended fabrics using different types of colourants.
- Contribute more trends and new development to the printing industry

TEXT BOOKS:
REFERENCES:

TC6604 INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS

OBJECTIVES:
- To enable the students to analyse the textiles and chemicals through various analytical instruments
- To enable the students to interpret the results from analytical instruments

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V
Errors, Precision and Accuracy : Definitions, Significant figures – Types of Errors – Methods of expressing accuracy and precision , Confidence limits.

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to
- Analyze the textiles and chemicals using different analytical instruments
- Interpret the results from analytical instruments
TEXT BOOKS:

REFERENCES:

TC6605 GARMENT MANUFACTURING AND PROCESSING L T P C
3 0 0 3

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 PATTERN MAKING AND CUTTING 9

UNIT II SEWING 9

UNIT III APPAREL PRODUCTION SYSTEMS 9

UNIT IV GARMENT DYEING 9

UNIT V GARMENT FINISHING 9
OUTCOMES:
Upon completion of the course, the students will
- Know about pattern making, cutting and sewing of apparels
- Know about dyeing and finishing of garments

TEXT BOOKS:

REFERENCES:
3. NCUTE – Programme series, Finishing of Garments and Knits, held at Ichalkaranchi, IIT,Delhi.

TC6611 TEXTILE FINISHING LABORATORY

OBJECTIVE:
To practice the students in finishing of textile materials for different requirements and end uses

LIST OF EXPERIMENTS
1. Finishing the given fabric using 2 % starch.
2. Finishing the given fabric using 2 % softener
4. Finish the sample using the given resin.
5. Giving water repellent Finish to the given fabric sample.
7. Crease recovery finishing of cotton.
9. Comparison of different resins for crease recovery finishing of cotton.
10. Weight reduction of polyester.
12. Scroopy finish for silk.

OUTCOMES:
Upon completing this course, the student would be able to
- Finish the fabric using starch, softners, resin, and water repellent, crease recovery finishes
- Finish the fabric for buckram finish and scroopy finish

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS
1. Padding mangle
2. Curing oven
3. Water Bath
4. Hand Dryer
5. Weighing Balance
6. Laundrometer
7. Crease recovery tester
8. Jigger
(Each one machine)
TC6612  GARMENT MANUFACTURING AND PROCESSING LABORATORY

OBJECTIVE:
To practice the students in manufacturing of garments and chemical processing of garments

LIST OF EXPERIMENTS
2. Design and construct Ladies Skirt.
3. Design and construct T-Shirt for men.
4. Dyeing of garments
5. Printing of garments using plastisol ink.
6. Metallic prints on garments
7. discharge prints on garments
8. transfer printing on garments
9. Khadi printing on garments
10. Bio-polishing on garments
11. Wrinkle free finish on garments
12. Stain proof finish on garments

TOTAL : 45 PERIODS

OUTCOMES:
On completion of this course, the student would be able to
- Design and construct garments for children, women and men
- Print the garment with different colourants
- Finish the garment for different applications

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS
1. Garment dyeing machine – 1No.
2. Sewing machine – 10 Nos.
4. Tumble dryer - 1No.
5. Ironing Table - 1No.
6. Table Screen printing Machine - 1No.
7. Curing chamber - 1No.

TC6613  TEXTILE DYEING AND PRINTING LABORATORY -II

OBJECTIVE:
To practice the students in dyeing of wool, silk and special printing of fabrics

LIST OF EXPERIMENTS
1. Dyeing of wool & silk with Direct Dyes.
2. Dyeing of wool & silk with Basic Dyes.
3. Dyeing of wool & silk with Metal Complex Dyes.
4. Dyeing of wool & silk with Acid Dyes.
5. Dyeing of wool & silk with Natural Dyes.
7. Striping and re-dyeing of wool & silk.
8. Effect of pH on dyeing of wool/silk with acid dyes.
9. Effect of Electrolyte on dyeing of wool/silk with acid dyes.
10. Effect of Temperature on dyeing of wool/silk with acid dyes.
11. Effect of Time on dyeing of wool/silk with acid dyes.
12. Tie and Dye style of printing on cotton fabrics
13. Batik styles print on cotton fabrics.
14. White Discharge on Reactive ground.
15. Colour Discharge on Reactive ground.
16. Burn out style printing.

TOTAL : 45 PERIODS

OUTCOMES:
On completion of this course, the student would be able to
- Dye wool and silk using different dyes
- Demonstrate the effect of parameters on dyeing of wool and silk
- Carryout special printing on textile fabrics

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS
1. Padding mangle
2. Winch
3. Jigger
4. Water Bath
5. Weighing Balance
6. Thermometer
7. Stop watch
8. pH Meter
9. Table Screen printing
10. Hot air oven
11. Curing Chamber
12. Lab Steamer
13. Hand Dryer
14. Mechanical Stirrer
   (Each one machine/equipment)

TC6701 WATER AND EFFLUENT TREATMENT AND POLLUTION CONTROL

OBJECTIVES:
- To impart awareness about the pollution created by different stages of wet processing
- To familiarize the students about the importance of water and its analysis
- To enable the students to understand about the waste water treatment plants and various treatments carried out

UNIT I
 Constituents of water and their effect on Textile wet processing – Water pollution – programmes which includes WHO, ISO standards for raw water criteria – Effluent discharge standards for inland surface water public sewers, on land for irrigation, marine coastal areas and drinking water parameters – Quality requirements of water for cotton and synthetic Textile processing . Water softening .Water analysis- Colour, pH value, dissolved solids, suspended solids, total hardness (Calcium + Magnesium)- EDTA method, total iron-thiocyanate method, Alkalinity, acidity , chlorides dissolved oxygen , BOD and COD.
UNIT II

UNIT III

UNIT IV

UNIT V

OUTCOMES:
Upon completion of the course, the students will be able to
- Understand the textile processing related causes for pollution
- Understand the effluent discharge standards and different processes involved in waste water treatment
- Perform the research and development to produce zero discharge effluents

TEXTBOOKS:

REFERENCES:

TT6701 TOTAL QUALITY MANAGEMENT FOR TEXTILE INDUSTRY

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

UNIT II TQM PRINCIPLES

UNIT III TQM TOOLS & TECHNIQUES I
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

UNIT V QUALITY SYSTEMS

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:

REFERENCES:

TC6702 PROCESS AND QUALITY CONTROL IN TEXTILE WET PROCESSING

OBJECTIVES:
- To enable the students to learn about the process control at machinery involved in the chemical processing
- To familiarize the students about the importance of process control and quality control
To enable the students to learn the various quality control tests involved in chemical processing

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V

TOTAL : 45 PERIODS

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

1. Measure the quality particulars of textile material at different stages of chemical processing and know the standards
2. carry out the various process and quality control measures during the chemical processing of textile materials

TEXTBOOKS:

REFERENCES:
1. Indian Standard Institution (Delhi) – ISI Handbook of Textile Testing, Indian Standards Inst., New Delhi, 2004
2. AATCC Technical manual, 2008 Association of Textile chemists and Colorists. USA.
3. Orientation Programme on Wet Processing-Quality & Process Control, BITRA Publications. 1986

TT6702 OPERATION RESEARCH FOR TEXTILE INDUSTRY

OBJECTIVES:
To enable the students to learn about
- Various operations research (OR) methods that can be applied in the textile industry
- Designing of OR problem related to textile industry
- Method of solving OR problems

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

UNIT IV
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
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:
REFERENCES:

TC6711  PRODUCT DEVELOPMENT LABORATORY  L T P C

OBJECTIVE:
To practice the students in developing the textile products based on wet processing

LIST OF EXPERIMENTS
1. Development of Low temperature peroxide bleaching in soft flow
2. Development of combined desizing and scouring using bio technology
3. Development of dyeing of cotton fabric with Jigger
4. Development of dyeing of cotton fabric with Winch
5. Development of one bath dyeing of PET / CO blends
6. Development of producing of aroma / Ayurvedic finishing on textile materials

TOTAL: 45 PERIODS

OUTCOME:
Upon completing this practical course, the student would be able to develop textile products using dyeing, finishing with special finishes

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS
1. Jigger
2. Winch
3. Padding mangle
4. Soft flow dyeing machine
5. Water Bath
6. Beaker dyeing machine
(Each one equipment)
TC6712  PROBLEM ANALYSIS AND CASE STUDIES IN WET PROCESSING LABORATORY  L T P C  0 0 3 2

OBJECTIVE:
To expose the students to analysis of problems related to chemical processing of textile materials.

LIST OF EXPERIMENTS
1. Analyse the Problem & Case Studies in Desizing
2. Analyse the Problem & Case Studies in Scouring
3. Analyse the Problem & Case Studies in Bleaching
4. Analyse the Problem & Case Studies in Mercerizing
5. Analyse the Problem & Case Studies in Dyeing
6. Analyse the Problem & Case Studies in Printing
7. Analyse the Problem & Case Studies in Finishing (Mecha FT6505 – Apparel Production Planning and Control nical and Chemical finishing)

REFERENCE:

TOTAL : 45 PERIODS

OUTCOME:
Upon completing this practical course, the student would be able to analyse the problems and find solutions for problems related to wet processing of textile materials.

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS
1. Padding mangle
2. Beaker Dyeing Machine
3. Hot air oven
4. Water Bath
5. Table screen Printing
7. IR Dyeing Machine
8. Steamer
9. Weighing Balance
10. Tensile strength tester
11. Jigger
12. Winch
13. Laundro Meter
14. Crock meter
(Each one machine)

TC6801  FINANCIAL MANAGEMENT IN TEXTILE INDUSTRY  L T P C  3 0 0 3

OBJECTIVES:
- To enable the students to 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  INTRODUCTION TO FINANCIAL MANAGEMENT  9

UNIT II  CAPITAL BUDGETING  9

UNIT III  COST OF CAPITAL  9
Concept of cost of capital- Determining Component Cost of Capital- Specific Cost of Capital- Overall cost of capital – Capital Structure- Designing Capital Structure

UNIT IV  WORKING CAPITAL MANAGEMENT  9
Principles and Concepts- Determinants - Operating Cycle - Cash Management-Short Term finance-Inventory Management- Receivable Management

UNIT V  LONG TERM SOURCES OF FINANCE  9
Long term finance: Shares, debentures and -term loans, lease, hire purchase, venture capital financing, Private Equity- Trade Credit- Bank Finance- Commercial Paper

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to
- Explain the basics of financial management applied to textile industry
- Understand the economical feasibility of capital investment, sources of capital and cost of capital applied

TEXT BOOKS:

REFERENCES:

TC6001  ECO - FRIENDLY DYES, CHEMICALS AND PROCESSING  L T P C
3 0 0 3

OBJECTIVES:
- To impart knowledge about the environmental and ecological aspects of various chemicals, dyes and auxiliaries used in processing.
- To make the students aware of the alternative chemicals and dyes that can replace the harmful chemicals.
- To update the students on the various rules, regulation that governs the textile processing industry.
UNIT I  INTRODUCTION

UNIT II  ECO-FRIENDLY PREPARATION, DYEING, PRINTING AND FINISHING

UNIT III  ECO-AUDIT

UNIT IV  ECO-NORMS AND ECO-LABELING

UNIT V  TESTING OF ECO-PARAMETERS

OUTCOMES:
- The study of this course would help the students to understand and comprehend the human and environmental hazards involved in day to day production activities in a textile wet processing mill.
- With the knowledge acquired from the other processing subjects along with his/her knowledge of the rules and regulations governing the processing industry he/she is better equipped to implement processes and new technologies which have lower environmental impact and so provide sustainable alternatives to the industry.
- This also helps and supports the students in making socially responsible and economically viable solutions.

TEXT BOOKS:

REFERENCES:
2. Eco Textiles '98, Bolton Institute, 1998
3. Eco Textiles, Book of Papers, BTRA, 1996
OBJECTIVES

- To enable the students to understand the concepts of modern printing technologies in printing of various kinds of fabrics using different colourants

UNIT I

UNIT II
Fabric preparation, Ink jet ink compositions; Mechanism of ink jet technology; Parameters influencing ink transfer; Colour depth in digital printing; Inks for printing – practical formulations; Precautions before and while printing; Selections of ink jet printers for fabric printing; Fixation / development of prints; After treatments.

UNIT III

UNIT IV

UNIT V
Computer aided design systems for textile printing - Recent developments in textile printing machinery including automation. Developments in thickeners, water based binders,

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to
- Understand the modern printing technologies available for printing textile fabrics.
- Contribute more trends and new development to the printing industry

TEXT BOOKS:
2. Tyler, Textile Digital Printing Technologies, Textile Institute Publication UK Vol. 37 No. 4, 2005

REFERENCES:
OBJECTIVES

- To enable the students to understand the importance of testing and analysis of various fibres and chemicals used in wet processing
- To expose the students to the analysis, estimation techniques for processing chemicals

UNIT I BASIC CONCEPTS


UNIT II ANALYSIS OF CHEMICALS IN PRETREATMENT


UNIT III ANALYSIS OF CHEMICALS IN DYEING AND PRINTING


UNIT IV ANALYSIS OF FINISHING CHEMICALS


UNIT V EVALUATION OF COMMON CHEMICALS

Estimation of the purity of the following chemicals, such as Hydrochloric acid, Sulfuric acid, Sodium Hydroxide, Sodium carbonate, Sodium Bicarbonate, Sodium Chloride and Sodium Sulphate – Estimation of Hydrogen peroxide content by iodimetry and permanaganometry – Estimation of the oxalic acid – Analysis of Potassium dichromate for total chromium content – Analysis of soap for moisture content unsaponifiable fat free alkyl and the total fatty acid – Estimation of Sodium hydro sulphate. Analysis of Sodium sulphide for its reducing power. Estimation of chemicals in mixtures viz Sodium carbonate/Sodium hydroxide and Sodium carbonate/Sodium bicarbonate

OUTCOMES:

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

- Analyse textile fibres and chemicals used for wet processing textile materials
- Analyse chemicals used for dyeing, printing and finishing

TOTAL : 45 PERIODS
TEXT BOOK:

REFERENCE:

TC6004 TECHNICAL TEXTILES

OBJECTIVE:
To enable the students to learn about production, properties & application of various technical textile products viz., tyre cords, fabrics, belts, filter fabrics and medical textiles.

UNIT I HIGH PERFORMANCE FIBRE

UNIT II TYRE CORDS AND FABRICS
Requirements of tyre cord - suitability of various fibres-Polyester and Nylon tyre cords - manufacture of tyre cords - physical and mechanical property requirements of tyre cord fabrics- fabric design - Specifications - Rubberised textiles.

UNIT III BELTS
Conveyor belts - physical and mechanical properties-construction, manufacture of conveyor belts & power transmission belts. HOSE: Construction, applications and properties (physical and mechanical).

UNIT IV FILTER FABRICS
General consideration of filtration of solids from liquids, solid from gases, solids from solids, liquids from liquids, liquids from gases and gases from gases.
PROTECTIVE CLOTHING: Fire protection-thermal protection - electro-magnetic protection - water proof fabrics - protection against microorganisms, chemicals and pesticides - protection against aerosols.

UNIT V MEDICAL TEXTILES

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to
- Understand different high performance fibres and their properties
- Explain various method of production of technical textiles, their properties and applications
TEXT BOOKS:

REFERENCES:
5. Kennady, Anand Miraftab, Rajandran, Medical Textile & Biomaterials for Health care, Woodhead publishing Ltd., UK, 2005

TC6005 FIBRE REINFORCED COMPOSITES

OBJECTIVES:
To enable the students to learn about
- Reinforcements, matrices used for the composites
- Manufacture of composites and
- Mechanics of failure of composites

UNIT I INTRODUCTION

UNIT II COMPOSITE MATERIALS

UNIT III PREPREGS
Introduction to manufacturing techniques - property requirements — Textile preforms - weaving, knitting and braiding.

UNIT IV COMPOSITE MANUFACTURING TECHNOLOGY
Vacuum bagging - compression moulding — injection moulding - pultrusion – thermoforming — filament winding - resin transfer moulding.

UNIT V PROPERTIES OF COMPOSITES

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 behaviors and
- Understand the mechanics of failure of composites
TEXT BOOKS:
3. Textile Progress monogram on “Hybrid yarns and textile performing for thermoplastic composites” by R. Alagirusamy, R Fangueiro, V. Ogale and N. Padaki Textile Progress 2006 Vol 38 No. 4 (Wood Head Publishing Limited)

REFERENCES:

TC6006 CLOTHING SCIENCE AND PRODUCT ENGINEERING

OBJECTIVES:
To enable the students to learn about the
- Measurement of properties of fabrics related to comfort
- Important characteristics of the fabric responsible for its comfort properties and
- Design logics of textile products and apparels.

UNIT I
DIMENTIONAL STABILITY: Hygral expansion - Relaxation shrinkage – Felting shrinkage - methods of measuring dimensional stability to dry cleaning and Dry heat.
SERVICEABILITY: Snagging - Pilling - Abrasion resistance - Tearing strength – Tensile strength - Bursting strength -Corrosive strength - Launderability - Crock resistance - Flammability - Scorching - Fusing - Static electricity - Seam strength and slippage

UNIT II
AESTHETICS: Colour - colour fastness - shade variation – colour measurement
UNIT III
FABRIC HANDLE: Bending - Drape - Crease recovery - fabric thickness - Shear – Bias extension -
formability - fabric friction - objective evaluation of fabric hand by KES and FAST

UNIT IV
INTRODUCTION TO DESIGN LOGIC OF TEXTILE PRODUCTS – Classification of textile products
and components. YARN DESIGN: Material, technology, and specifications - yarn design elements -
design based on structure and material properties
FABRIC DESIGN: Material, technology, and specifications - Fabric design elements - design based
on structure and material properties

UNIT V
DESIGN OF APPAREL FABRICS : Design of women’s & Girl’s wear - fabric types and materials for
European, American and Indian styles - design of men’s and boy’s wear - fabric type and materials
for European, American and Indian styles – Tailorability of fabrics – tailorability of woven and knitted
garments – tailorability of leather garments – tailorability of fur garments.

TOTAL : 45 PERIODS

OUTCOME:
Upon completion of this course, the student shall be able to understand different phenomena such
as wetting, wicking and, heat and moisture interaction and Engineer the textile products and design
apparels.

TEXT BOOKS:
   Society, Japan, Osaka, 1983
3. PradipV, Metha, "An Introduction to Quality Control for the Apparel Industry", ASQC Quality
   Press, Marcel Dekker Inc" New York, 1992

REFERENCES:
   1984.
   Institute, Manchester, 1997.
4. Saville B.P, Physical Testing of Textiles, The Textile Institute, Wood head publishing limited,
5. Matisunita, Design Logics, Textile Progress, UK

TC6007 NONWOVEN FABRICS AND SPECIALTY FABRICS

OBJECTIVES:
To enable the students to learn about
- Production of fabrics by different non woven technologies
- Finishing and testing non wovens
and to expose the students to specialty fabrics, their construction and applications
UNIT I  INTRODUCTION

UNIT II  BONDING

UNIT III  FINISHING AND TESTING

UNIT IV  APPLICATIONS AND PRODUCT DEVELOPMENT
Nonwovens for hygiene, medicine – safety, cleaning, household products, home textiles - apparels and technical applications. Re-utilization of nonwovens Concepts and definitions - Product development for garments, decorative fabrics, home textiles and technical textiles. Costing of nonwoven products. Techno economics

UNIT V  SPECIALTY FABRICS

OUTCOMES:
Upon completion of this course, the student shall be able to
• Understand different methods of production and testing of nonwovens and
• Understand different types of specialty fabrics

TEXTBOOKS:

REFERENCES:
OBJECTIVES:

- To enable the students to learn about the working principles of wet processing machineries.
- To enable the students to know about the operations of machines and its maintenance schedules.
- To expose the students to latest wet processing machineries.

UNIT I
Advances in continuous processing of cotton and wool materials - Advances in heating systems hank and yarn dyeing machines (cheese and warp) - importance of winding in yarn dyeing - calculation of winding density - detailed maintenance schedule for cheese dyeing machines. Use of microprocessors in processing machines.

UNIT II
Advances in Beam dyeing - Advances in soft flow, over flow, jet dyeing machines — Developments in jiggers, — Detail maintenance schedule for beam dyeing, jet dyeing and jiggers.

UNIT III
Detail study and developments in vertical drying ranges - RF dryer, yarn dryer, tubular & open width knitted fabric dryer, Tumble dryer, developments in balloon padding, hydro extractor, rope opener, maintenance schedule for the above machines. Heating systems for hot air stenters, Clip & pin type of stenters; Jig stenters — over feeding system and its importance - Hot flue dryer — float dryer — maintenance schedule for the above machines.

UNIT IV

UNIT V

TOTAL : 45 PERIODS

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

- Understand about the advances in wet processing of textile materials
- Understand about advanced wet processing machinery used in the industry

TEXTBOOKS:

REFERENCES:
TC6009   ENERGY MANAGEMENT AND CONSERVATION IN TEXTILE INDUSTRY   L T P C
                           3  0  0  3

OBJECTIVES:
To enable the students to learn about
- Consumption of energy at various sectors of textile industries
- Techniques of saving energy

UNIT I   SOURCES OF ENERGY
Limitations of Natural resources. Unexploited energy sources and problems in their exploitation. Concept of energy management - need for energy conservation- global energy scenario with specific reference to India -Demand side Management (DSM).

UNIT II   ENERGY CONSUMPTION

UNIT III   ENERGY AUDIT
Concept - Types of audit - Instrumentation - methodology - analysis. Electrical and Thermal audit

UNIT IV   ENERGY CONSERVATION

UNIT V   NON-CONVENTIONAL ENERGY SOURCES

TOTAL : 45 PERIODS

OUTCOME:
Upon completion of this course, the student would understand the consumption of energy at difference stage of processing, energy audit procedure, energy conservation and different types of non conventional energy sources available.

TEXTBOOKS:
REFERENCES:

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

UNIT II

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

UNIT IV
Human Rights in India – Constitutional Provisions / Guarantees.

UNIT V

TOTAL : 45 PERIODS

OUTCOME:
• Engineering students will acquire the basic knowledge of human rights.

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

UNIT I HUMAN VALUES 10

UNIT II ENGINEERING ETHICS 9

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

UNIT V GLOBAL ISSUES 8

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

TEXT BOOKS:

REFERENCES:

Web sources:
1. www.onlineethics.org
TT6503

KNITTING TECHNOLOGY

L T P C

3 0 3

OBJECTIVES

To make the students to understand

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

UNIT I

INTRODUCTION


UNIT II

FUNDAMENTALS OF KNITTING

General definitions and principles of knitting; Types of knitting needles – Bearded, Latch & Compound Needle. Elements of knitted loop structure.

UNIT III

WEFT KNITTING

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

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

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.

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

TEXT BOOKS:


REFERENCES:

TC6010 HOME TEXTILES

OBJECTIVES:
To enable the students to learn about the
• Recent developments in furnishing, floor covering and other home textile products
• Various kinds of materials used in home textile.

UNIT I HOME FURNISHING

UNIT II FLOOR COVERINGS

UNIT III CURTAINS AND DRAPERIES

UNIT IV BED LINERS
UNIT V TOWELS


TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of this course, the student shall be able to
• Know about different types of home textiles
• Understand the production method of different types of home textile products

TEXT BOOKS:

REFERENCE:

GE6083 DISASTER MANAGEMENT

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
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)
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 stakeholders- 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
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

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

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, Scenarios in the Indian context,
- Disaster damage assessment and management.

TEXTBOOKS:

REFERENCES
1. Govt. of India: Disaster Management Act, Government of India, New Delhi, 2005