1. **Programme Educational Objectives (PEOs)**

Bachelor of Textile Chemistry curriculum is designed to prepare the graduates having attitude and knowledge to

a) Have powerful base to pursue a successful professional and technical career

b) Have strong foundation in basic sciences, mathematics, engineering and experimentation skills to comprehend the manufacturing processes and provide practical and innovative solutions.

c) Have knowledge on the theory and practices in the field of textile chemistry and allied areas to manage textile chemical processing industry and provide techno-economic solutions to the problems.

d) Engross in life-long learning to keep abreast with emerging technology

e) Practice and inspire high ethical values and maintain high technical standards

2. **Programme Outcome (POs)**

1. Apply knowledge of the fundamental principles of mathematics, science and textile wet processing to solve complex technological problems.

2. Identify and analyse, with the aid of relevant research surveys, complex technical problems related to textile chemical processing using modern resources and tools and the fundamental principles of mathematics and engineering sciences.

3. Apply creativity in the design of systems, components or processes related to textile chemical processing so as to meet specifications and with due consideration for public health and safety, and those related to cultural, societal and environmental issues.

4. Conduct, analyse and interpret experiments to investigate problems in textile chemical processing and apply the results to improve process and product quality Ability to communicate effectively and work in interdisciplinary groups.

5. Create, select and apply appropriate techniques, resources, and modern technological and IT
tools in professional work related to textile chemical processing

6. Apply logical thinking derived from knowledge of textile chemical processing to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to professional work

7. Demonstrate an understanding of the impact of professional textile chemical processing solutions in societal and environmental contexts, and display knowledge of, and the dire need for sustainability

8. Apply ethical principles and commit to professional ethics and responsibilities, and norms of professional practice

9. Function effectively as an individual, and as a member or leader in diverse teams working in textile / garment / textile processing related projects, and in multidisciplinary settings

10. Communicate effectively with the professional community, comprehend and write effective reports, give and receive clear instructions, and make professional presentations effectively

11. Apply knowledge of management principles in project management, finance and continuous improvement in professions related to textile chemical processing

12. Recognise the need for, and display ability to engage in lifelong learning to keep in line with changing technology.

3. PROGRAM SPECIFIC OUTCOMES (PSOs):

By the completion of Textile Chemistry program, the student will have following program specific Outcomes.

1. Foundational knowledge to make a successful career in textile wet processing and textile products sectors.

2. Adequate soft and communication skills to effectively face industry and society.

3. Graduates with professional ethics and social responsibility.

4. Graduates with ability to understand problems of the textile wet processing sector and design and develop solutions.

PEO’s – PO’s & PSO’s MAPPING:

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# NCC Credit Course level 1 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.

$ Skill Based Course

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**TOTAL** 18 1 7 26 22.5

$ Skill Based Course
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# NCC Credit Course level 2 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.

*Four weeks industrial training/internship carries two credits. Industrial training/internship during IV Semester Summer Vacation will be evaluated in V semester.
### Semester V

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* Mandatory Course-I is a Non-credit Course (Student shall select one course from the list given under MC-I)

**Four weeks industrial training/internship carries two credits. Industrial training/internship during IV Semester Summer Vacation will be evaluated in V semester.

### Semester VI

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*Open Elective – I shall be chosen from the emerging technologies.
**Two weeks industrial training/internship carries one credit. Industrial training/Internship during VI Semester Summer Vacation will be evaluated in VII semester
# Mandatory Course-II is a Non-credit Course (Student shall select one course from the list given under MC- II)
# NCC Credit Course level 3 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.

### SEMESTER VII/VIII

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**TOTAL 20 0 0 20 22 22**

*If students undergo internship in Semester VII, then the courses offered during semester VII will be offered during semester VIII.

**Open Elective – II shall be chosen from the emerging technologies.
***Open Elective III and IV (Shall be chosen from the list of open electives offered by other Programmes
# Elective- Management shall be chosen from the Elective Management courses
##Two weeks industrial training/internship carries one credit. Industrial training/Internship during VI Semester Summer Vacation will be evaluated in VII semester

### SEMESTER VIII/VII

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*If students undergo internship in Semester VII, then the courses offered during semester VII will be offered during semester VIII.

#15 weeks of continuous Internship in an organization carries 10 credits.

**TOTAL CREDITS: 165**
## ELECTIVE – MANAGEMENT COURSES

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<td>Management</td>
<td>Technical Textiles</td>
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<td>Garment Manufacturing Technology</td>
<td>Supply Chain Management</td>
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<td>Textile and apparel EXIM Management</td>
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**Registration of Professional Elective Courses from Verticals:**

Professional Elective Courses will be registered in Semesters V and VI. These courses are listed in groups called verticals that represent a particular area of specialisation. Students are permitted to choose all Professional Electives from a particular vertical or from different verticals. Further, only one Professional Elective course shall be chosen in a semester horizontally (row-wise). However, two courses are permitted from the same row, provided one course is enrolled in Semester V and another in Semester VI.

The registration of courses for B.E./B.Tech (Honours) or Minor degree shall be done from Semester V to VIII. The procedure for registration of courses explained above shall be followed for the courses of B.E/B.Tech (Honours) or Minor degree also. For more details on B.E./B.Tech (Honours) or Minor degree shall be obtained from Regulations 2021 Clause 4.10.
# PROFESSIONAL ELECTIVE COURSES: VERTICALS

## VERTICAL 1: CHEMICAL PROCESSING

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### VERTICAL 4: TECHNICAL TEXTILES

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Students shall choose the open elective courses, such that the course contents are not similar to any other course contents/title under other course categories.

**OPEN ELECTIVE I AND II**  
**EMERGING TECHNOLOGIES**

To be offered other than Faculty of Information and Communication Engineering

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**OPEN ELECTIVES – III**

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## SUMMARY

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**Enrollment for B.E. / B. Tech. (Honours) / Minor degree (Optional)**

A student can also optionally register for additional courses (18 credits) and become eligible for the award of B.E./B.Tech. (Honours) Minor degree.

For B.E. / B. Tech. (Honours), a student shall register for the additional courses (18 credits) from semester V onwards. These courses shall be from the same vertical or a combination of different verticals of the same programme of study only.

For minor degree, a student shall register for the additional courses (18 credits) from semester V onwards. All these courses have to be in a particular vertical from any one of the other programmes. Moreover, for minor degree the student can register for courses from any one of the following verticals also.

Complete details are available in clause 4.10 of Regulations 2021.

**VERTICALS FOR MINOR DEGREE** (IN ADDITIONS TO ALL THE VERTICALS OF OTHER PROGRAMMES)

<table>
<thead>
<tr>
<th>Vertical I</th>
<th>Vertical II</th>
<th>Vertical III</th>
<th>Vertical IV</th>
<th>Vertical V</th>
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<td>Fintech and Block Chain</td>
<td>Foundations of Entrepreneurship</td>
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<td>Statistics For Management</td>
<td>Sustainable infrastructure Development</td>
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<td>Financial Management</td>
<td>Team Building &amp; Leadership Management for Business</td>
<td>Institution of India</td>
<td>Data Mining For Business Intelligence</td>
<td>Sustainable Agriculture and Environmental Management</td>
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<tr>
<td>Fundamentals of Investment</td>
<td>Creativity &amp; Innovation in Entrepreneurship</td>
<td>Public Personnel Administration</td>
<td>Human Resource Analytics</td>
<td>Sustainable Bio Materials</td>
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<tr>
<td>Banking, Financial Services and Insurance</td>
<td>Principles of Marketing Management For Business</td>
<td>Administrative Theories</td>
<td>Marketing And Social Media Web Analytics</td>
<td>Materials for Energy Sustainability</td>
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<tr>
<td>Introduction to Blockchain and its Applications</td>
<td>Human Resource Management for Entrepreneurs</td>
<td>Indian Administrative System</td>
<td>Operations And Supply Chain Analytics</td>
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<td>Integrated Energy Planning for Sustainable Development</td>
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<td>-</td>
<td>-</td>
<td>Energy Efficiency for Sustainable Development</td>
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(Choice of courses for Minor degree is to be made from any one vertical of other programmes or from anyone of the following verticals)

**VERTICAL 1: FINTECH AND BLOCK CHAIN**

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<th>TOTAL CONTACT PERIODS</th>
<th>CREDITS</th>
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<td>2.</td>
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<td>4.</td>
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**VERTICAL 2: ENTREPRENEURSHIP**

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### VERTICAL 4: BUSINESS DATA ANALYTICS

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This is a mandatory 2 week programme to be conducted as soon as the students enter the institution. Normal classes start only after the induction program is over.

The induction programme has been introduced by AICTE with the following objective:

“Engineering colleges were established to train graduates well in the branch/department of admission, have a holistic outlook, and have a desire to work for national needs and beyond. The graduating student must have knowledge and skills in the area of his/her study. However, he/she must also have broad understanding of society and relationships. Character needs to be nurtured as an essential quality by which he/she would understand and fulfill his/her responsibility as an engineer, a citizen and a human being. Besides the above, several meta-skills and underlying values are needed.”

“One will have to work closely with the newly joined students in making them feel comfortable, allow them to explore their academic interests and activities, reduce competition and make them work for excellence, promote bonding within them, build relations between teachers and students, give a broader view of life, and build character. “

Hence, the purpose of this programme is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.

The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.

(i) Physical Activity
This would involve a daily routine of physical activity with games and sports, yoga, gardening, etc.

(ii) Creative Arts
Every student would choose one skill related to the arts whether visual arts or performing arts. Examples are painting, sculpture, pottery, music, dance etc. The student would pursue it everyday for the duration of the program. These would allow for creative expression. It would develop a sense of aesthetics and also enhance creativity which would, hopefully, grow into engineering design later.

(iii) Universal Human Values
This is the anchoring activity of the Induction Programme. It gets the student to explore oneself and allows one to experience the joy of learning, stand up to peer pressure, take decisions with courage, be aware of relationships with colleagues and supporting stay in the hostel and department, be sensitive to others, etc. A module in Universal Human Values provides the base. Methodology of teaching this content is extremely important. It must not be through do's and don'ts, but get students to explore and think by engaging them in a dialogue. It is best taught through group discussions and real life activities rather than lecturing. Discussions would be conducted in small groups of about 20 students with a faculty mentor each. It would be effective that the faculty mentor assigned is also the faculty advisor for the student for the full duration of the UG programme.

(iv) Literary Activity
Literary activity would encompass reading, writing and possibly, debating, enacting a play etc.

(v) Proficiency Modules
This would address some lacunas that students might have, for example, English, computer familiarity etc.
(vi) Lectures by Eminent People
Motivational lectures by eminent people from all walks of life should be arranged to give the students exposure to people who are socially active or in public life.

(vii) Visits to Local Area
A couple of visits to the landmarks of the city, or a hospital or orphanage could be organized. This would familiarize them with the area as well as expose them to the underprivileged.

(viii) Familiarization to Dept./Branch & Innovations
They should be told about what getting into a branch or department means what role it plays in society, through its technology. They should also be shown the laboratories, workshops & other facilities.

(ix) Department Specific Activities
About a week can be spent in introducing activities (games, quizzes, social interactions, small experiments, design thinking etc.) that are relevant to the particular branch of Engineering / Technology / Architecture that can serve as a motivation and kindle interest in building things (become a maker) in that particular field. This can be conducted in the form of a workshop. For example, CSE and IT students may be introduced to activities that kindle computational thinking, and get them to build simple games. ECE students may be introduced to building simple circuits as an extension of their knowledge in Science, and so on. Students may be asked to build stuff using their knowledge of science.

Induction Programme is totally an activity based programme and therefore there shall be no tests / assessments during this programme.

REFERENCES:
Guide to Induction program from AICTE

HS3151 PROFESSIONAL ENGLISH I

OBJECTIVES:
- To improve the communicative competence of learners
- To learn to use basic grammatic structures in suitable contexts
- To acquire lexical competence and use them appropriately in a sentence and understand their meaning in a text
- To help learners use language effectively in professional contexts
- To develop learners’ ability to read and write complex texts, summaries, articles, blogs, definitions, essays and user manuals.

UNIT I INTRODUCTION TO EFFECTIVE COMMUNICATION
What is effective communication? (Explain using activities) Why is communication critical for excellence during study, research and work? What are the seven C’s of effective communication? What are key language skills? What is effective listening? What does it involve? What is effective speaking? What does it mean to be an excellent reader? What should you be able to do? What is effective writing? How does one develop language and communication skills? What does the course focus on? How are communication and language skills going to be enhanced during this course? What do you as a learner need to do to enhance your English language and communication skills to get the best out of this course?
UNIT I  INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION  8
Reading - Reading brochures (technical context), telephone messages / social media messages relevant to technical contexts and emails. Writing - Writing emails / letters introducing oneself. Grammar - Present Tense (simple and progressive); Question types: Wh/ Yes or No/ and Tags. Vocabulary - Synonyms; One word substitution; Abbreviations & Acronyms (as used in technical contexts).

UNIT II  NARRATION AND SUMMATION  9
Reading - Reading biographies, travelogues, newspaper reports, Excerpts from literature, and travel & technical blogs. Writing - Guided writing-- Paragraph writing Short Report on an event (field trip etc.) Grammar –Past tense (simple); Subject-Verb Agreement; and Prepositions. Vocabulary - Word forms (prefixes& suffixes); Synonyms and Antonyms. Phrasal verbs.

UNIT III  DESCRIPTION OF A PROCESS / PRODUCT  9
Reading – Reading advertisements, gadget reviews; user manuals. Writing - Writing definitions; instructions; and Product /Process description. Grammar - Imperatives; Adjectives; Degrees of comparison; Present & Past Perfect Tenses. Vocabulary - Compound Nouns, Homonyms; and Homophones, discourse markers (connectives & sequence words).

UNIT IV  CLASSIFICATION AND RECOMMENDATIONS  9
Reading – Newspaper articles; Journal reports –and Non Verbal Communcation ( tables, pie charts etc., ). Writing – Note-making / Note-taking (*Study skills to be taught, not tested); Writing recommendations; Transferring information from non verbal ( chart , graph etc. to verbal mode) Grammar – Articles; Pronouns - Possessive & Relative pronouns. Vocabulary - Collocations; Fixed / Semi fixed expressions.

UNIT V  EXPRESSION  9
Reading – Reading editorials; and Opinion Blogs; Writing – Essay Writing (Descriptive or narrative). Grammar – Future Tenses, Punctuation; Negation (Statements & Questions); and Simple, Compound & Complex Sentences. Vocabulary - Cause & Effect Expressions – Content vs Function words.

LEARNING OUTCOMES :
At the end of the course, learners will be able
- To use appropriate words in a professional context
- To gain understanding of basic grammatic structures and use them in right context.
- To read and infer the denotative and connotative meanings of technical texts
- To write definitions, descriptions, narrations and essays on various topics

TOTAL : 45 PERIODS

TEXT BOOKS :
1. English for Engineers & Technologists Orient Blackswan Private Ltd. Department of English, Anna University, (2020 edition)
2. English for Science & Technology Cambridge University Press, 2021. Authored by Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

REFERENCE BOOKS:
ASSESSMENT PATTERN
Two internal assessments and an end semester examination to test students’ reading and writing skills along with their grammatical and lexical competence.

MA3151 MATRICES AND CALCULUS L T P C
3 1 0 4

COURSE OBJECTIVES:
- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To familiarize the students with differential calculus.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To make the students understand various techniques of integration.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.

UNIT I MATRICES 9+3

UNIT II DIFFERENTIAL CALCULUS 9+3

UNIT III FUNCTIONS OF SEVERAL VARIABLES 9+3

UNIT IV INTEGRAL CALCULUS 9+3
Definite and Indefinite integrals - Substitution rule - Techniques of Integration : Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals - Applications : Hydrostatic force and pressure, moments and centres of mass.

UNIT V MULTIPLE INTEGRALS 9+3
Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals – Applications : Moments and centres of mass, moment of inertia

TOTAL: 60 PERIODS

COURSE OUTCOMES:
At the end of the course the students will be able to
CO1 : Use the matrix algebra methods for solving practical problems.
CO2 : Apply differential calculus tools in solving various application problems.
CO3 : Able to use differential calculus ideas on several variable functions.
CO4 : Apply different methods of integration in solving practical problems.
CO5 : Apply multiple integral ideas in solving areas, volumes and other practical problems.

TEXT BOOKS :
3. James Stewart, "Calculus : Early Transcendentals", Cengage Learning, 8th Edition, New Delhi, 2015. [For Units I & IV - Sections 1.1, 2.2, 2.3, 2.5, 2.7 (Tangents problems only), 2.8, 3.1 to 3.6, 3.11, 4.1, 4.3, 5.1 (Area problems only), 5.2, 5.3, 5.4 (excluding net change theorem), 5.5, 7.1 - 7.4 and 7.8].

REFERENCES :

PH3151 ENGINEERING PHYSICS L T P C 3 0 0 3

COURSE OBJECTIVES
- To make the students effectively to achieve an understanding of mechanics.
- To enable the students to gain knowledge of electromagnetic waves and its applications.
- To introduce the basics of oscillations, optics and lasers.
- Equipping the students to successfully understand the importance of quantum physics.
- To motivate the students towards the applications of quantum mechanics.

UNIT I MECHANICS

UNIT II ELECTROMAGNETIC WAVES
The Maxwell’s equations - wave equation; Plane electromagnetic waves in vacuum, Conditions on the wave field - properties of electromagnetic waves: speed, amplitude, phase, orientation and waves in matter - polarization - Producing electromagnetic waves - Energy and momentum in EM waves: Intensity, waves from localized sources, momentum and radiation pressure - Cell-phone reception. Reflection and transmission of electromagnetic waves from a non-conducting medium-vacuum interface for normal incidence.

UNIT III OSCILLATIONS, OPTICS AND LASERS
UNIT IV  BASIC QUANTUM MECHANICS  
Photons and light waves - Electrons and matter waves –Compton effect - The Schrodinger equation (Time dependent and time independent forms) - meaning of wave function - Normalization –Free particle - particle in a infinite potential well: 1D,2D and 3D Boxes- Normalization, probabilities and the correspondence principle.

UNIT V  APPLIED QUANTUM MECHANICS  
The harmonic oscillator(qualitative)- Barrier penetration and quantum tunneling(qualitative)- Tunneling microscope - Resonant diode - Finite potential wells (qualitative)- Bloch’s theorem for particles in a periodic potential –Basics of Kronig-Penney model and origin of energy bands.  

TOTAL: 45 PERIODS

COURSE OUTCOMES
After completion of this course, the students should be able to
- CO1 : Understand the importance of mechanics.
- CO2 : Express their knowledge in electromagnetic waves.
- CO3 : Demonstrate a strong foundational knowledge in oscillations, optics and lasers.
- CO4 : Understand the importance of quantum physics.
- CO5 : Comprehend and apply quantum mechanical principles towards the formation of energy bands.

TEXT BOOKS:
2. E.M.Purcell and D.J.Morin, Electricity and Magnetism, Cambridge Univ.Press, 2013.

REFERENCES:

CY3151            ENGINEERING CHEMISTRY
L T P C
3 0 0 3

COURSE OBJECTIVES:
- To inculcate sound understanding of water quality parameters and water treatment techniques.
- To impart knowledge on the basic principles and preparatory methods of nanomaterials.
- To introduce the basic concepts and applications of phase rule and composites.
- To facilitate the understanding of different types of fuels, their preparation, properties and combustion characteristics.
- To familiarize the students with the operating principles, working processes and applications of energy conversion and storage devices.

UNIT I  WATER AND ITS TREATMENT  
Water: Sources and impurities, Water quality parameters: Definition and significance of-color, odour, turbidity, pH, hardness, alkalinity, TDS, COD and BOD, flouride and arsenic. Municipal

UNIT II NANOCHEMISTRY
Basics: Distinction between molecules, nanomaterials and bulk materials; Size-dependent properties (optical, electrical, mechanical and magnetic); Types of nanomaterials: Definition, properties and uses of – nanoparticle, nanocluster, nanorod, nanowire and nanotube. Preparation of nanomaterials: sol-gel, solvothermal, laser ablation, chemical vapour deposition, electrochemical deposition and electro spinning. Applications of nanomaterials in medicine, agriculture, energy, electronics and catalysis.

UNIT III PHASE RULE AND COMPOSITES
Phase rule: Introduction, definition of terms with examples. One component system - water system; Reduced phase rule; Construction of a simple eutectic phase diagram - Thermal analysis; Two component system: lead-silver system - Pattinson process. Composites: Introduction: Definition & Need for composites; Constitution: Matrix materials (Polymer matrix, metal matrix and ceramic matrix) and Reinforcement (fiber, particulates, flakes and whiskers). Properties and applications of: Metal matrix composites (MMC), Ceramic matrix composites and Polymer matrix composites. Hybrid composites - definition and examples.

UNIT IV FUELS AND COMBUSTION

UNIT V ENERGY SOURCES AND STORAGE DEVICES
Stability of nucleus: mass defect (problems), binding energy; Nuclear energy: light water nuclear power plant, breeder reactor. Solar energy conversion: Principle, working and applications of solar cells; Recent developments in solar cell materials. Wind energy; Geothermal energy; Batteries: Types of batteries, Primary battery - dry cell, Secondary battery - lead acid battery and lithium-ion-battery; Electric vehicles; working principles; Fuel cells: H₂-O₂ fuel cell, microbial fuel cell; Supercapacitors: Storage principle, types and examples.

COURSE OUTCOMES
At the end of the course, the students will be able:
CO1 :To infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water.
CO2 :To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.
CO3 :To apply the knowledge of phase rule and composites for material selection requirements.
CO4 :To recommend suitable fuels for engineering processes and applications.
CO5 :To recognize different forms of energy resources and apply them for suitable application in energy sectors.

TEXT BOOKS:
GE3151 PROBLEM SOLVING AND PYTHON PROGRAMMING

OBJECTIVES:
- To understand the basics of algorithmic problem solving.
- To learn to solve problems using Python conditionals and loops.
- To define Python functions and use function calls to solve problems.
- To use Python data structures - lists, tuples, dictionaries to represent complex data.
- To do input/output with files in Python.

UNIT I COMPUTATIONAL THINKING AND PROBLEM SOLVING

UNIT II DATA TYPES, EXPRESSIONS, STATEMENTS
Python interpreter and interactive mode, debugging; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT III CONTROL FLOW, FUNCTIONS, STRINGS
Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT IV LISTS, TUPLES, DICTIONARIES
Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and
UNIT V    FILES, MODULES, PACKAGES  9
Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file, Voter's age validation, Marks range validation (0-100).

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of the course, students will be able to
CO1: Develop algorithmic solutions to simple computational problems.
CO2: Develop and execute simple Python programs.
CO3: Write simple Python programs using conditionals and looping for solving problems.
CO4: Decompose a Python program into functions.
CO5: Represent compound data using Python lists, tuples, dictionaries etc.
CO6: Read and write data from/to files in Python programs.

TEXT BOOKS:

REFERENCES:
5. https://www.python.org/
அலகு I  மரபு வர்த்தகம் கற்பியல்: 3
தமிழர் மரபுக்கள் - அழகிய மரபுக்கள் - தமிழ் தொல்லியல் -
தமிழ் சுயமரியென் மரபுக்கள் - கல்வி நோக்குப் பாடல்கள் -
சாத்தியக் கற்பியல் பாடல்கள், தமிழ் சுயமரியென் மரபுக்கள் -
மொழி மற்றும் இலக்கியம்: 3
இந்திய தமிழ் குடும்பங்கள் - திரோவிட தமிழ் குடும்பங்கள் -
தமிழ் ஒரு தெம்தமொழி - தமிழ் தெவ்விலக்கியங்கள் -
ஏற்றுமாறு இலக்கியம் - மனம் மர்த்தனைகள் - தமிழ் கொப்பியங்கள் -
பாதுகாப்பு மூலம் பார்க்கவுல்ல அதிகாரிகள் பாலச்செயல்.

அலகு II  மரபு - பரப்பு விளாசம் பல்வேறு விளாசத்துக்களும் பல்வேறு விளாசத்துக்களும் பல்வேறு விளாசத்துக்களும் தொடங்கல்: 3
தொடங்கல்: தொடங்கல் தொடங்கல் தொடங்கல்: தொடங்கல் தொடங்கல் -
பயிற்சிப்பிட்டு பயிற்சிப்பிட்டு பயிற்சிப்பிட்டு - பயிற்சிப்பிட்டு பயிற்சிப்பிட்டு -
தமிழ் பயிற்சிப்பிட்டு பயிற்சிப்பிட்டு பயிற்சிப்பிட்டு -
தமிழ் பயிற்சிப்பிட்டு பயிற்சிப்பிட்டு - தமிழ் பயிற்சிப்பிட்டு:
தொடங்கல்: தொடங்கல் தொடங்கல் தொடங்கல்: 3
தொடங்கல்: தொடங்கல் தொடங்கல்: தொடங்கல் தொடங்கல் -
பயிற்சிப்பிட்டு பயிற்சிப்பிட்டு பயிற்சிப்பிட்டு - பயிற்சிப்பிட்டு பயிற்சிப்பிட்டு -
தமிழ் பயிற்சிப்பிட்டு:

அலகு III  சுருக்கம் கற்பியல் மற்றும் விளாசங்கள்: 3
சுருக்கம் கற்பியல் சுருக்கம் கற்பியல் -
சுருக்கம் கற்பியல் சுருக்கம்:

அலகு IV  தமிழக சிறியக் கற்பியல்: 3
தமிழக சிறியக் கற்பியல் தமிழக சிறியக் கற்பியல் -
தமிழக சிறியக் கற்பியல் தமிழக சிறியக் கற்பியல் -
தமிழக சிறியக் கற்பியல்:

அலகு V  தமிழ் சுயமரியென் பொட்டியா சுயமரியென் பொட்டியா சுயமரியென் பொட்டியா: 3
தமிழ் சுயமரியென் பொட்டியா சுயமரியென் பொட்டியா -
தமிழ் சுயமரியென் பொட்டியா சுயமரியென் பொட்டியா -
தமிழ் சுயமரியென் பொட்டியா:

TEXT-CUM-REFERENCE BOOKS
1. தமிழக வரலை - மாதத்தும் பரப்பாளிகள் - ச.தி. பிராந்தியம் (தமிழில்: தமிழக வரலை - மாதத்தும் பரப்பாளிகள் - ச.தி. பிராந்தியம்).
2. கல்வி தமிழ் - பல்வேறு தமிழ் கல்வி. (தமிழில்: பல்வேறு தமிழ் கல்வி).
3. சிற்பங்கள் - சிற்பங்கள் தமிழக சிற்பங்கள் - தமிழக சிற்பங்கள் -
சிற்பங்கள் தமிழக சிற்பங்கள் - சிற்பங்கள் தமிழக சிற்பங்கள் -
சிற்பங்கள் தமிழக சிற்பங்கள் - சிற்பங்கள் தமிழக சிற்பங்கள் -
சிற்பங்கள் தமிழக சிற்பங்கள் - சிற்பங்கள் தமிழக சிற்பங்கள் -
சிற்பங்கள் தமிழக சிற்பங்கள் -
4. பல்வேறு தமிழக கற்பியல். (தமிழில்: பல்வேறு தமிழக கற்பியல்)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)

TOTAL : 15 PERIODS
6. Social Life of the Tamils - The Classical Period (Dr. S. Singaravelu) (Published by: International Institute of Tamil Studies).
7. Historical Heritage of the Tamils (Dr. S. V. Subatamanian, Dr. K. D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr. M. Valarmathi) (Published by: International Institute of Tamil Studies).
9. Keechadi - Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu).
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr. K. K. Pillay) (Published by: The Author).
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu).

GE3152 HERITAGE OF TAMILS  
LT 1 0 0 1  C
UNIT I LANGUAGE AND LITERATURE  3

UNIT II HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE  3

UNIT III FOLK AND MARTIAL ARTS  3
Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

UNIT IV THINAI CONCEPT OF TAMILS  3
Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.

UNIT V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE  3
Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.

TOTAL : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS
1. தமிழ் மற்றும் பாரம்பரியம் - முதலாம் பாரம்பரியம் – தி.தி. பிரசுரம் (களார்புரி:  

2. கல்லிங்கம் - புராணம் உடைய சாக கற்றகம் (செந்திருந்தல் புகழ்பெறும்).
3. தீர்த்த முக்கியக்குறிப்பில் முக்கியமான தீர்த்த கற்றகம் (விள்ளார்புரிய தீர்த்த கற்றகம்)
4. பொறுமான – அற்கொன்றம் சராசரிக்கொ (செதுக்கிற கதை பேர்ப்பு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi – ‘Sangam City Civilization on the banks of river Vaigai’ (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published

GE3171    PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY    L T P C
          0 0 4 2

OBJECTIVES:
1. To understand the problem solving approaches.
2. To learn the basic programming constructs in Python.
3. To practice various computing strategies for Python-based solutions to real world problems.
4. To use Python data structures - lists, tuples, dictionaries.
5. To do input/output with files in Python.

EXPERIMENTS:
Note: The examples suggested in each experiment are only indicative. The lab instructor is expected to design other problems on similar lines. The Examination shall not be restricted to the sample experiments listed here.
1. Identification and solving of simple real life or scientific or technical problems, and developing flow charts for the same. (Electricity Billing, Retail shop billing, Sin series, weight of a motorbike, Weight of a steel bar, compute Electrical Current in Three Phase AC Circuit, etc.)
2. Python programming using simple statements and expressions (exchange the values of two variables, circulate the values of n variables, distance between two points).
3. Scientific problems using Conditionals and Iterative loops. (Number series, Number Patterns, pyramid pattern)
4. Implementing real-time/technical applications using Lists, Tuples. (Items present in a library/Components of a car/ Materials required for construction of a building –operations of list & tuples)
5. Implementing real-time/technical applications using Sets, Dictionaries. (Language, components of an automobile, Elements of a civil structure, etc.- operations of Sets & Dictionaries)
6. Implementing programs using Functions. (Factorial, largest number in a list, area of shape)
7. Implementing programs using Strings. (reverse, palindrome, character count, replacing characters)
8. Implementing programs using written modules and Python Standard Libraries (pandas, numpy, Matplotlib, scipy)
9. Implementing real-time/technical applications using File handling. (copy from one file to another, word count, longest word)
10. Implementing real-time/technical applications using Exception handling. (divide by zero error, voter’s age validity, student mark range validation)
12. Developing a game activity using Pygame like bouncing ball, car race etc.

**TOTAL: 60 PERIODS**

**OUTCOMES:**
On completion of the course, students will be able to:
CO1: Develop algorithmic solutions to simple computational problems
CO2: Develop and execute simple Python programs.
CO3: Implement programs in Python using conditionals and loops for solving problems.
CO4: Deploy functions to decompose a Python program.
CO5: Process compound data using Python data structures.
CO6: Utilize Python packages in developing software applications.

**TEXT BOOKS:**

**REFERENCES:**
5. https://www.python.org/

**BS3171 PHYSICS AND CHEMISTRY LABORATORY**

**PHYSICS LABORATORY : (Any Seven Experiments)**

**COURSE OBJECTIVES:**
- To learn the proper use of various kinds of physics laboratory equipment.
- To learn how data can be collected, presented and interpreted in a clear and concise manner.
- To learn problem solving skills related to physics principles and interpretation of experimental data.
- To determine error in experimental measurements and techniques used to minimize such error.
- To make the student as an active participant in each part of all lab exercises.

**LIST OF EXPERIMENTS**
1. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of regular and irregular objects.
2. Simple harmonic oscillations of cantilever.
3. Non-uniform bending - Determination of Young’s modulus
4. Uniform bending – Determination of Young’s modulus
5. Laser- Determination of the wave length of the laser using grating
6. Air wedge - Determination of thickness of a thin sheet/wire
7. a) Optical fibre - Determination of Numerical Aperture and acceptance angle
b) Compact disc - Determination of width of the groove using laser.
8. Acoustic grating - Determination of velocity of ultrasonic waves in liquids.
9. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids
11. Photoelectric effect
12. Michelson Interferometer.
13. Melde’s string experiment
14. Experiment with lattice dynamics kit.

TOTAL: 30 PERIODS

COURSE OUTCOMES:
Upon completion of the course, the students should be able to
CO1: Understand the functioning of various physics laboratory equipment.
CO2: Use graphical models to analyze laboratory data.
CO3: Use mathematical models as a medium for quantitative reasoning and describing physical reality.
CO4: Access, process and analyze scientific information.
CO5: Solve problems individually and collaboratively.

CHEMISTRY LABORATORY: (Any seven experiments)
OBJECTIVES:
- To inculcate experimental skills to test basic understanding of water quality parameters, such as, acidity, alkalinity, hardness, DO, chloride and copper.
- To induce the students to familiarize with electroanalytical techniques such as, pH metry, potentiometry and conductometry in the determination of impurities in aqueous solutions.
- To demonstrate the analysis of metals and alloys.
- To demonstrate the synthesis of nanoparticles

CHEMISTRY LABORATORY: (Any seven experiments to be conducted)
1. Preparation of Na₂CO₃ as a primary standard and estimation of acidity of a water sample using the primary standard
2. Determination of types and amount of alkalinity in water sample.
   - Split the first experiment into two
3. Determination of total, temporary & permanent hardness of water by EDTA method.
4. Determination of DO content of water sample by Winkler’s method.
5. Determination of chloride content of water sample by Argentometric method.
6. Estimation of copper content of the given solution by Iodometry.
7. Estimation of TDS of a water sample by gravimetry.
8. Determination of strength of given hydrochloric acid using pH meter.
9. Determination of strength of acids in a mixture of acids using conductivity meter.
10. Conductometric titration of barium chloride against sodium sulphate (precipitation titration)
11. Estimation of iron content of the given solution using potentiometer.
13. Preparation of nanoparticles (TiO₂/ZnO/CuO) by Sol-Gel method.
14. Estimation of Nickel in steel
15. Proximate analysis of Coal

TOTAL: 30 PERIODS

OUT COMES:
- To analyse the quality of water samples with respect to their acidity, alkalinity, hardness and DO.
- To determine the amount of metal ions through volumetric and spectroscopic techniques
- To analyse and determine the composition of alloys.
- To learn simple method of synthesis of nanoparticles
- To quantitatively analyse the impurities in solution by electroanalytical techniques
TEXT BOOK:

GE3172 ENGLISH LABORATORY

OBJECTIVES:
- To improve the communicative competence of learners
- To help learners use language effectively in academic/work contexts
- To develop various listening strategies to comprehend various types of audio materials like lectures, discussions, videos etc.
- To build on students’ English language skills by engaging them in listening, speaking and grammar learning activities that are relevant to authentic contexts.
- To use language efficiently in expressing their opinions via various media.

UNIT I INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION
Listening for general information-specific details - conversation: Introduction to classmates - Audio/video (formal & informal); Telephone conversation; Listening to voicemail & messages; Listening and filling a form. Speaking - making telephone calls-Self Introduction; Introducing a friend; - politeness strategies- making polite requests, making polite offers, replying to polite requests and offers- understanding basic instructions( filling out a bank application for example).

UNIT II NARRATION AND SUMMATION
Listening - Listening to podcasts, anecdotes / stories / event narration; documentaries and interviews with celebrities. Speaking - Narrating personal experiences / events - describing experiences and feelings- engaging in small talk- describing requirements and abilities.

UNIT III DESCRIPTION OF A PROCESS / PRODUCT
Listening - Listen to product and process descriptions; a classroom lecture; and advertisements about products. Speaking – Picture description- describing locations in workplaces- Giving instruction to use the product- explaining uses and purposes- Presenting a product- describing shapes and sizes and weights- talking about quantities(large & small)-talking about precautions.

UNIT IV CLASSIFICATION AND RECOMMENDATIONS
Listening – Listening to TED Talks; Listening to lectures - and educational videos. Speaking – Small Talk; discussing and making plans-talking about tasks-talking about progress- talking about positions and directions of movement-talking about travel preparations- talking about transportation-

UNIT V EXPRESSION
Listening – Listening to debates/ discussions; different viewpoints on an issue; and panel discussions. Speaking – making predictions- talking about a given topic-giving opinions-understanding a website-describing processes

TOTAL: 30 PERIODS

LEARNING OUTCOMES:
At the end of the course, learners will be able
- To listen and comprehend complex academic texts
- To speak fluently and accurately in formal and informal communicative contexts
- To express their opinions effectively in both oral and written medium of communication
ASSESSMENT PATTERN
- One online / app based assessment to test listening /speaking
- End Semester ONLY listening and speaking will be conducted online.
- Proficiency certification is given on successful completion of listening and speaking internal test and end semester exam.

HS3251 PROFESSIONAL ENGLISH -II

OBJECTIVES:
- To engage learners in meaningful language activities to improve their reading and writing skills
- To learn various reading strategies and apply in comprehending documents in professional context.
- To help learners understand the purpose, audience, contexts of different types of writing
- To develop analytical thinking skills for problem solving in communicative contexts
- To demonstrate an understanding of job applications and interviews for internship and placements

UNIT I    MAKING COMPARISONS  6
Reading - Reading advertisements, user manuals, brochures; Writing – Professional emails, Email etiquette - Compare and Contrast Essay; Grammar – Mixed Tenses, Prepositional phrases

UNIT II    EXPRESSING CAUSAL RELATIONS IN SPEAKING AND WRITING  6
Reading - Reading longer technical texts– Cause and Effect Essays, and Letters / emails of complaint, Writing - Writing responses to complaints. Grammar - Active Passive Voice transformations, Infinitive and Gerunds

UNIT III    PROBLEM SOLVING  6
Reading - Case Studies, excerpts from literary texts, news reports etc. Writing – Letter to the Editor, Checklists, Problem solution essay / Argumentative Essay. Grammar – Error correction; If conditional sentences

UNIT IV    REPORTING OF EVENTS AND RESEARCH  6

UNIT V    THE ABILITY TO PUT IDEAS OR INFORMATION COGENTLY  6
Reading – Company profiles, Statement of Purpose, (SOP), an excerpt of interview with professionals; Writing – Job / Internship application – Cover letter & Resume; Grammar – Numerical adjectives, Relative Clauses.

TOTAL : 30 PERIODS

OUTCOMES:
At the end of the course, learners will be able
- To compare and contrast products and ideas in technical texts.
- To identify cause and effects in events, industrial processes through technical texts
- To analyse problems in order to arrive at feasible solutions and communicate them orally and in the written format.
- To report events and the processes of technical and industrial nature.
- To present their opinions in a planned and logical manner, and draft effective resumes in context of job search.

TEXT BOOKS:
3. Authored by Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

REFERENCE BOOKS:

ASSESSMENT PATTERN
Two internal assessments and an end semester examination to test students’ reading and writing skills along with their grammatical and lexical competence.

MA3251 STATISTICS AND NUMERICAL METHODS

OBJECTIVES:
• This course aims at providing the necessary basic concepts of a few statistical and numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology.
• To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
• To introduce the basic concepts of solving algebraic and transcendental equations.
• To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
• To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.

UNIT I TESTING OF HYPOTHESIS
Sampling distributions - Tests for single mean, proportion and difference of means (Large and small samples) – Tests for single variance and equality of variances – Chi square test for goodness of fit – Independence of attributes.

UNIT II DESIGN OF EXPERIMENTS
One way and two way classifications - Completely randomized design – Randomized block design – Latin square design - $2^2$ factorial design.

UNIT III SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS
UNIT IV  INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION  9+3
Lagrange’s and Newton’s divided difference interpolations – Newton’s forward and backward difference interpolation – Approximation of derivates using interpolation polynomials – Numerical single and double integrations using Trapezoidal and Simpson’s 1/3 rules.

UNIT V  NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS  9+3

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

- Apply the concept of testing of hypothesis for small and large samples in real life problems.
- Apply the basic concepts of classifications of design of experiments in the field of agriculture.
- Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.
- Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.
- Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.

TEXT BOOKS:

REFERENCES:

PH3257 PHYSICS FOR TEXTILE TECHNOLOGISTS  L T P C
3 0 0 3

COURSE OBJECTIVES:
- To make the students effectively to understand the basics of crystallography and crystal imperfections.
- To enable the students to get knowledge on ferrous and nonferrous alloys.
- To impart knowledge on the basics of ceramics, composites and nanomaterials.
- To learn about mechanical properties of materials.
- To introduce the concept of light - matter interactions and electro-optical effects.
UNIT I  CRYSTALLOGRAPHY

UNIT II  FERROUS AND NONFERROUS ALLOYS

UNIT III  CERAMICS, COMPOSITES AND NANO MATERIALS

UNIT IV  MECHANICAL PROPERTIES

UNIT V  OPTICAL PROPERTIES OF MATERIALS

COURSE OUTCOMES:
Upon completion of this course, the students should be able to
CO1: Understand the basics of crystallography and its importance in materials properties
CO2: Understand the basics of crystallography and crystal imperfections.
CO3: Get knowledge on ferrous and nonferrous alloys.
CO4: Acquire knowledge on the basics of ceramics, composites and nano-materials
CO5: Learn about the concept of light - matter interactions and electro-optical effects.

TEXT BOOKS:
3. Safa O. Kasap, Optoelectronics and Photonics, Dorling Kindersley India, 2009

REFERENCES:
COURSE OUTCOMES:
After completing this course, the students will be able to
CO1: Compute the electric circuit parameters for simple problems
CO2: Explain the concepts of domestics wiring and protective devices
CO3: Explain the working principle and applications of electrical machines
CO4: Analyze the characteristics of analog electronic devices
CO5: Explain the types and operating principles of sensors and transducers

TEXT BOOKS:
3. S.K. Bhattacharya, Basic Electrical Engineering, Pearson Education, 2019
4. James A Svoboda, Richard C. Dorf, Dorf’s Introduction to Electric Circuits, Wiley, 2018

REFERENCES:

GE3251 ENGINEERING GRAPHICS L T P C
2 0 4 4

COURSE OBJECTIVES:
The main learning objective of this course is to prepare the students for:
1. Drawing engineering curves.
2. Drawing freehand sketch of simple objects.
3. Drawing orthographic projection of solids and section of solids.
4. Drawing development of solids
5. Drawing isometric and perspective projections of simple solids.

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 6+12
Basic Geometrical constructions, Curves used in engineering practices: Conics — Construction of ellipse, parabola and hyperbola by eccentricity method — Construction of cycloid — construction of involutes of square and circle — Drawing of tangents and normal to the above curves.

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACE 6+12
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.

45
UNIT III  PROJECTION OF SOLIDS AND FREEHAND SKETCHING  6+12
Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method. Visualization concepts and Free Hand sketching: Visualization principles — Representation of Three Dimensional objects — Layout of views — Freehand sketching of multiple views from pictorial views of objects.
Practicing three dimensional modeling of simple objects by CAD Software (Not for examination)

UNIT IV  PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES  6+12
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.
Practicing three dimensional modeling of simple objects by CAD Software (Not for examination)

UNIT V  ISOMETRIC AND PERSPECTIVE PROJECTIONS  6+12
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 - Perspective projection of simple solids - Prisms, pyramids and cylinders by visual ray method. Practicing three dimensional modeling of isometric projection of simple objects by CAD Software (Not for examination)

OUTCOMES:
On successful completion of this course, the student will be able to
- Use BIS conventions and specifications for engineering drawing.
- Construct the conic curves, involutes and cycloid.
- Solve practical problems involving projection of lines.
- Draw the orthographic, isometric and perspective projections of simple solids.
- Draw the development of simple solids.

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

CY3252 CHEMISTRY FOR TEXTILE TECHNOLOGISTS  L T P C
3 0 0 3

OBJECTIVES:
The course aims to
- Gain proper understanding on spectroscopic and surface analytical techniques.
- Impart knowledge to students on the chemistry of surface and interfaces.
- Make students well versed on the chemical analysis of oils, fats, soaps & lubricants.
- Firmly establish a sound understanding on the student’s mind about chemicals and auxiliaries.
- Familiarize students with the identification and characteristics of dyes and their applications.

UNIT I SPECTROSCOPIC TECHNIQUES
Spectroscopy: Electromagnetic spectrum - absorption of radiation - electronic, vibrational and rotational transitions. Width and intensities of spectral lines. Flame photometer, Atomic absorption spectroscopy, UV- Vis, IR spectroscopy, Scanning Electron Microscope (SEM) and Transmission Electron Microscope (TEM) - principles, instrumentation (Block diagram) and applications.

UNIT II CHEMISTRY OF INTERFACES

UNIT III WATER TECHNOLOGY
Water: Sources and impurities; Significance and estimation (only mention of methods) of turbidity, colour, pH, acidity, alkalinity, hardness, solids, chlorides, residual chlorine, sulphates, fluorides, phosphates, iron and manganese, DO, BOD, COD, nitrogen, grease, volatile acids.
Treatment of water: Zeolites process and ion exchange demineralization; Desalination of water: Reverse osmosis and Electro dialysis; Municipal water treatment: Primary treatment and Disinfection (UV, Ozonation, break-point chlorination).

UNIT IV OILS, FATS, SOAPS & LUBRICANTS
Chemical constitution, Chemical analysis of oils and fats – acid, saponification and iodine values, Definitions, determinations and significance. Definition, mechanism of lubrication, preparation of petrolubes, desirable characteristics – viscosity, viscosity index, carbon residue, oxidation stability, flash and fire points, cloud and pour points, aniline point. Semisolid lubricant – greases, preparation of sodium, lithium, calcium and axle greases and uses, consistency test and drop point test. Solid lubricants – graphite and molybdenum disulphide.

UNIT V CHEMICALS AND AUXILIARIES
Estimation of available chlorine in hypochlorite bleach liquor. Determination of strength of hydrogen peroxide. Colorants - Theory of colour and constitution: chromophore and auxochrome, bathochromic and hypsochromic shift, classification of dyes based on application and composition. Chemistry of azo dye – synthesis of Methyl red, Methyl orange, Congo red, phenolphthalein, fluorescein and eosin

TOTAL: 45 PERIODS
COURSE OUTCOMES:
At the end of the course, the students will be able to:
CO1: Understand and apply spectroscopic techniques for the analysis of engineering materials for their end use applications.
CO2: Make use of the applications of adsorption in detergency, wetting, spreading, foaming, de-foaming, and water repellence and separation processes.
CO3: Analyse and estimate oils, fats, lubricants and soap for their intended applications.
CO4: Distinguish and demonstrate the role of different types of chemicals and auxiliaries.
CO5: Realize the chemical structures, properties and relationships of different types of dyes and their applications.

TEXTBOOKS:

REFERENCES:
UNIT IV

WEAVING AND CERAMIC TECHNOLOGY

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

UNIT II

DESIGN AND CONSTRUCTION TECHNOLOGY

Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.
UNIT III  MANUFACTURING TECHNOLOGY  3
Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel - Copper and gold-
Coins as source of history - Minting of Coins – Beads making - industries Stone beads - Glass
beads - Terracotta beads - Shell beads/ bone beats - Archeological evidences - Gem stone types
described in Silappathikaram.

UNIT IV  AGRICULTURE AND IRRIGATION TECHNOLOGY  3
Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry -
Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries –
Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.

UNIT V  SCIENTIFIC TAMIL & TAMIL COMPUTING  3
Development of Scientific Tamil - Tamil computing - Digitalization of Tamil Books – Development
of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries –
Sorkuvai Project.

TOTAL: 15 PERIODS

TEXT-CUM-REFERENCE BOOKS
1. தமிழக வரலொறு – மக்களும் பண் பொடும் – மக.மக.பிளமள (தவளியீடு: தமிழ்நொடு பொடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முமனவர் இல (சுந்தரம். (விகடன் பிரசுரம்)).
3. கீழடி – மவமக நதிக்கமரயில் (ததொல்லியல் துமறதவளியீடு)
4. பொருமந – ஆற்றங்கமர நொகரிகம். (ததொல்லியல் துமறதவளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies).
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8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
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10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference
Book.
NCC Credit Course Level 1*

NX3251  (ARMY WING) NCC Credit Course Level - I  L T P C

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<td>Aims, Objectives &amp; Organization of NCC</td>
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<td>NCC 2</td>
<td>Incentives</td>
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<td>Duties of NCC Cadet</td>
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<td>NCC Camps: Types &amp; Conduct</td>
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<td>National Integration: Importance &amp; Necessity</td>
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<td>Communication Skills</td>
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TOTAL: 30 PERIODS
NCC Credit Course Level 1*

NX3252  (NAVAL WING) NCC Credit Course Level - I

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TOTAL : 30 PERIODS
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TOTAL : 30 PERIODS
COURSE OBJECTIVES:

- Drawing pipe line plan; laying and connecting various pipe fittings used in common household plumbing work; Sawing; planing; making joints in wood materials used in common household wood work.
- Wiring various electrical joints in common household electrical wire work.
- Welding various joints in steel plates using arc welding work; Machining various simple processes like turning, drilling, tapping in parts; Assembling simple mechanical assembly of common household equipments; Making a tray out of metal sheet using sheet metal work.
- Soldering and testing simple electronic circuits; Assembling and testing simple electronic components on PCB.

GROUP – A (CIVIL & ELECTRICAL)

PART I CIVIL ENGINEERING PRACTICES 15

PLUMBING WORK:

a) Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in household.

b) Preparing plumbing line sketches.

c) Laying pipe connection to the suction side of a pump

d) Laying pipe connection to the delivery side of a pump.

e) Connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.

WOOD WORK:

a) Sawing,

b) Planing and

c) Making joints like T-Joint, Mortise joint and Tenon joint and Dovetail joint.

Wood Work Study:

a) Studying joints in door panels and wooden furniture

b) Studying common industrial trusses using models.

PART II ELECTRICAL ENGINEERING PRACTICES 15

a) Introduction to switches, fuses, indicators and lamps - Basic switch board wiring with lamp, fan and three pin socket

b) Staircase wiring

c) Fluorescent Lamp wiring with introduction to CFL and LED types.

d) Energy meter wiring and related calculations/calibration

e) Study of Iron Box wiring and assembly

f) Study of Fan Regulator (Resistor type and Electronic type using Diac/Triac/quadrac)

g) Study of emergency lamp wiring/Water heater

GROUP – B (MECHANICAL AND ELECTRONICS)

PART III MECHANICAL ENGINEERING PRACTICES 15

WELDING WORK:

a) Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding.

b) Practicing gas welding.

BASIC MACHINING WORK:

a) (simple) Turning.

b) (simple) Drilling.

c) (simple) Tapping.
ASSEMBLY WORK:
   a) Assembling a centrifugal pump.
   b) Assembling a household mixer.
   c) Assembling an air conditioner.

SHEET METAL WORK:
   a) Making of a square tray

FOUNDRY WORK:
   a) Demonstrating basic foundry operations.

PART IV   ELECTRONIC ENGINEERING PRACTICES

SOLDERING WORK:
   a) Soldering simple electronic circuits and checking continuity.

ELECTRONIC ASSEMBLY AND TESTING WORK:
   a) Assembling and testing electronic components on a small PCB.

ELECTRONIC EQUIPMENT STUDY:
   a) Study an elements of smart phone.
   b) Assembly and dismantle of LED TV.
   c) Assembly and dismantle of computer/ laptop

COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
CO1 : Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work.
CO2 : Wire various electrical joints in common household electrical wire work.
CO3 : Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipments; Make a tray out of metal sheet using sheet metal work.
CO4 : Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.

TOTAL: 60 PERIODS

BE3272 BASIC ELECTRICAL, ELECTRONICS AND INSTRUMENTATION
ENGINEERING LABORATORY

COURSE OBJECTIVES:
- To train the students in conducting load tests electrical machines
- To gain practical experience in experimentally obtaining the characteristics of electronic devices and rectifiers
- To train the students to measure three phase power and displacement

LIST OF EXPERIMENTS
1. Verification of ohms and Kirchhoff's Laws.
2. Three Phase Power Measurement
3. Load test on DC Shunt Motor.
4. Load test on Self Excited DC Generator
5. Load test on Single phase Transformer
6. Load Test on Induction Motor
7. Characteristics of PN and Zener Diodes
8. Characteristics of BJT, SCR and MOSFET
9. Design and analysis of Half wave and Full Wave rectifiers
10. Measurement of displacement of LVDT

TOTAL: 60 PERIODS

COURSE OUTCOMES:
After completing this course, the students will be able to

CO1: Use experimental methods to verify the Ohm’s law and Kirchhoff’s Law and to measure three phase power
CO2: Analyze experimentally the load characteristics of electrical machines
CO3: Analyze the characteristics of basic electronic devices
CO4: Use LVDT to measure displacement

GE3272 COMMUNICATION LABORATORY L T P C
(Second Semester) 0 0 4 2

OBJECTIVES
- To identify varied group discussion skills and apply them to take part in effective discussions in a professional context.
- To be able to communicate effectively through writing.

UNIT I 12
Speaking: Role Play Exercises Based on Workplace Contexts, - talking about competition - discussing progress toward goals - talking about experiences - talking about events in life - discussing past events - Writing: writing emails (formal & semi-formal).

UNIT II 12
Speaking: discussing news stories - talking about frequency - talking about travel problems - discussing travel procedures - talking about travel problems - making arrangements - discussing plans and decisions - discussing purposes and reasons - understanding common technology terms - Writing: - writing different types of emails.

UNIT III 12
Speaking: discussing predictions - describing the climate - discussing forecasts and scenarios - talking about purchasing - discussing advantages and disadvantages - making comparisons - discussing likes and dislikes - discussing feelings about experiences - discussing imaginary scenarios - Writing: short essays and reports - formal/semi-formal letters.

UNIT IV 12
Speaking: discussing the natural environment - describing systems - describing position and movement - explaining rules - (example - discussing rental arrangements) - understanding technical instructions - Writing: writing instructions - writing a short article.

UNIT V 12
Speaking: describing things relatively - describing clothing - discussing safety issues (making recommendations) - talking about electrical devices - describing controlling actions - Writing: job application (Cover letter + Curriculum vitae) - writing recommendations.

TOTAL: 60 PERIODS

LEARNING OUTCOMES
- Speak effectively in group discussions held in a formal/semi formal contexts.
- Write emails and effective job applications.
Assessment Pattern

- One online / app based assessment to test speaking and writing skills
- Proficiency certification is given on successful completion of speaking and writing.

MA3357 PROBABILITY AND STATISTICAL METHODS

OBJECTIVE:

- To develop Probability techniques in manufacturing and quality evaluation process.
- To familiarize the students with two dimensional random variables.
- To familiarize the student with Differential Equations.
- To make the students to understand various techniques of Correlation and Time series Analysis.
- To acquaint the student with mathematical tools needed in evaluating Statistical quality control and to apply in the textile manufacturing industry.

UNIT I PROBABILITY AND RANDOM VARIABLES 9+3

UNIT II TWO DIMENSIONAL RANDOM VARIABLES 9+3
Join distributions – Marginal distributions and conditional distributions – Moments – Covariance – Transforms of random variables – Central limit theorem.

UNIT III DIFFERENTIAL EQUATIONS 9+3

UNIT IV CORRELATION, REGRESSION, INDEX NUMBERS AND TIMES SERIES ANALYSIS 9+3
Correlation analysis, estimation of regression line. Time series analysis: Variations in time series, trend analysis, cyclical variations, seasonal variations and irregular variations. Index Numbers – Laspereyre’s, Paasche’s and Fisher’s Ideal Index.

UNIT V STATISTICAL QUALITY CONTROL 9+3
Control charts for measurements (X and R chart) – Control charts for attributes (p, C and np) charts – Tolerance limits – acceptance Sampling.

OUTCOMES:
At the end of the course the students will be able to

CO1: Use the Probability techniques for solving practical problems.
CO2: Apply two dimensional random variable tools in solving various problems.
CO3: Able to solve differential Equations by applying various techniques.
CO4: Apply different methods of Correlation, Regression, Index Numbers and Times series Analysis in solving practical problems.
CO5: Apply statistical techniques in solving manufacturing and management related problems

TEXT BOOKS:
REFERENCES:


TC3301 POLYMER AND ORGANIC CHEMISTRY

OBJECTIVE:

- Polymerization and characterization of various polymers

UNIT I POLYMERIZATION


UNIT II IMPORTANT POLYMERS

Synthesis, properties and Applications: Polyethylene (LDPE & HDPE), Polymethyl methacrylate, Polymers (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 Thermo mechanical methods. Determination molecular weights – Weight average – Light scattering, Number average – End group analysis, Viscosity average – Ubbelholde viscometer. Thermal characterization – TGA and DSC.

UNIT IV AROMATIC HYDROCARBON, AMINE AND DIAZONIUM SALT

methods of preparation – Physical and chemical properties – Carbylamines reaction – Aryldiazonium salts – Preparation and synthetic applications.

UNIT V ALDEHYDES, KETONES AND ACIDS

TOTAL: 45 PERIODS.

OUTCOMES:
At the end of the course the students will be able to understand
CO1: Polymerization.
CO2: Important Polymers.
CO3: Characterization Of Polymers.
CO4: Aromatic Hydrocarbon, Amine And Diazonium Salt.
CO5: Aldehydes, Ketones And Acids

TEXT BOOKS:

REFERENCES:
4. Bleaching & Mercerizing – BTRA Silver Jubilee Monograph series
5. Technology of Mercerizing by J.T. Marsh

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OBJECTIVE:
- To describe individual operation used in pre-treatment and physical – chemical changes brought into textile material.
- To explain chemical formulations and process parameters used in unit operations of pre-treatment and properties of chemicals used.
- To explain machinery used in pre-treatments operations.
- To discuss quality parameters and environmental impact of pre-treatment operations.
- 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 SCOURING

UNIT III BLEACHING

UNIT IV MERCERISATION
Mercerizing – conditions. Physical and Chemical changes – Mercerizing of coloured goods P/C blends and tubular knits. Effects of Time, Tension, Caustic Concentration, Temp on mercerizing effects. Stack mercerizing, Hot mercerizing, mercerizing of blending fabrics.

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. Milling, Grabbing and potting

OUTCOMES:
CO1: Illustrate individual operation used in pre-treatment and physical – chemical changes brought into textile material.
CO2: Demonstrate chemical formulations and process parameters used in unit operations of pre-treatment and properties of chemicals used.
CO3: Explain machinery used in pre-treatments operations.
CO4: Explain quality parameters and environmental impact of pre-treatment operations.
CO5: Design wet processing techniques such as singeing, desizing, mercerizing, scouring and bleaching of different textile materials at desired levels.
TEXT BOOKS:

REFERENCES:
4. Bleaching & Mercerizing – BTRA Silver Jubilee Monograph series
5. Technology of Mercerizing by J.T. Marsh

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TC3303 STRUCTURE AND PROPERTIES OF FIBRES L T P C 3003

OBJECTIVES:
To enable the students to
- Enhance their knowledge related to the structure and morphology of textile fibres.
- Understand the mechanical, physical characteristics of fibres.

UNIT I STRUCTURE OF FIBRES

UNIT II STRUCTURE INVESTIGATION TECHNIQUES
Transmission and Scanning electron microscopes-principle construction and working; X-ray diffraction techniques – X-ray analysis-estimation of crystallinity; Infrared radiation and dichroism techniques – chemical element and group identification by transmittance and optical density methods. Molecular orientation estimation, Typical molecular structures of commercially important fibers.
UNIT III MOISTURE ABSORPTION CHARACTERISTICS OF FIBRES

UNIT IV TENSILE CHARACTERISTICS OF FIBRES
Tensile characteristics – Study of strength, elongation, work of rupture, initial modulus, work factor and yield point – determination of yield point. Stress-strain relations of natural and manmade fibres - influence of humidity and temperature on tensile characteristics .Time effects- Study of creep phenomena.

UNIT V ELASTIC RECOVERY- OPTICAL AND FRICTIONAL BEHAVIOUR OF FIBRES

OUTCOMES:
Upon completion of the course, the students shall have knowledge on
- CO1: Structure and properties of fibres.
- CO2: Method of investigation of structure of fibres.
- CO3: Moisture properties of fibres.
- CO4: Tensile and elongation properties of fibres.
- CO5: Optical, thermal and frictional characteristics of fibres.

TEXT BOOKS:
1. Morton W. E. and Hearle J. W. S., “Physical Properties of Textile Fibres”, The Textile Institute,

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OBJECTIVE:
- To enable the students to understand various processes involved in conversion of fibre to yarn by ring spinning system and other spinning systems.
- To impart knowledge on weaving and non-woven technologies of fabric manufacturing and the machinery used.

UNIT I GINNING, BLOW ROOM, CARDING AND DRAWING
Ginning – objectives, types, working principle and ginning performance on yarn quality; opening and cleaning – objectives of blow room machines, principle of opening, cleaning and blending machines, principles of carding, working of carding machine; drawing machine – objectives, drafting system – types and applications, principles of auto levelers

UNIT II COMBER, ROVING
Comber preparation – objectives, principles of sliver lap ribbon lap and super lap formers; comber - principle of combing, sequence of combing operation; Roving machine – objectives, working principle and operation

UNIT III SPINNING
Ring spinning machine – objectives, working principle and operation; Principles of yarn formation and material flow – rotor, friction, air-jet and air vortex spinning

UNIT IV WINDING, SIZING

UNIT V WEAVING

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of this course, the student shall be able to
CO1: Understand the Ginning, Blow Room, Carding and Drawing.
CO2: Understand the Principle and operations of Comber preparation, comber, Roving.
CO3: Understand the Principle and operations of Ring spinning, rotor, friction, air-jet and air-vortex Spinning.
CO4: Understand the Principle and operations of cone winding, Pirn winding, Warping, Sizing.
CO5: Understand the Principle and operations of Tappet looms, Dobby looms, Drop box Looms, Jacquard looms, Shuttle less looms.
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TC3305 CHEMISTRY OF TEXTILE AUXILIARIES L T P C 3 0 0 3

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

UNIT I MODIFICATION OF SURFACE TENSION 9
Auxiliaries: Importance and functions; Surfactants: Mode of action and classification of surfactants – cationic, anionic, nonionic surfactants.

UNIT II PREPARATORY PROCESS 9
Auxiliaries associated with De-sizing, scouring, Bleaching of cellulosic fibres, Protein fibres and synthetic fibres.

UNIT III DYEING PROCESS 9
Auxiliaries associated with Dyeing with Direct Dyes, Reactive, Vat, Azoic colors, Sulphur dyes, Acid dyes, Metal complex dyes, Basic and Disperse dyes.
UNIT IV  PRINTING PROCESS  
Auxiliaries associated with printing: Direct Style of Printing, Discharge style of Printing, Resist style of printing.

UNIT V  FINISHING PROCESS  
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 know about role of auxiliaries in
1. CO1: Modification of surface tension
2. CO2: Preparatory Process
3. CO3: Dyeing Process
4. CO4: Printing Process
5. CO5: Finishing Process

TEXT BOOKS:

REFERENCES:
8. Dr. N N Mahapatra., “Textile dyeing”, Woodhead publishing India, 2018

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OBJECTIVE:
To enable the students to practically understand
- material passage in yarn spinning machines and carry out related calculations
- mechanisms of weaving machine

LIST OF EXPERIENCES
1. Material passage and production calculation in
   a. Blow room scutcher
   b. Carding machine
   c. Comber
   d. Draw frame
   e. Speed frame
2. Material passage, draft, twist and production calculation in ring frame
3. Material passage and production calculation in winding machine
4. Timing diagram of weaving machine
5. Shedding mechanisms - Tappet, dobbý
6. Jacquard mechanism
7. Picking mechanism and calculation of shuttle speed
8. Beat-up mechanism
9. Let-off and take-up mechanism
10. Auxiliary mechanisms

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of this practical course, the students shall be able to
- CO1: Understand the material passage in the yarn production machine
- CO2: Draw drive flow diagram and carry out related calculations
- CO3: Identify the components of spinning and weaving machines
- CO4: Understand material passage in winding machines and timing diagram of weaving machine
- CO5: Understand the mechanism of various operations of weaving machine

LAB EQUIPMENTS
LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS
1. Blow room Line – 1 No.
2. Carding machine – 1 No.
3. Drawing machine – 1 No.
5. Roving machine – 1 No.
6. Ring Frame – 1 No.
9. Loom with tappet shedding – 1 No.
10. Loom with dobbý shedding – 1 No.
11. Loom with jacquard – 1 No.
12. Loom with drop box – 1 No.
(Commercial machine of miniature model of machine)
OBJECTIVE:
To enable the students to understand the

- Identification of fibres by different methods
- Method of characterization of fibres

LIST OF EXPERIEMENTS
1. Identification of natural, regenerated and synthetic fibres
2. Preparation of density gradient column and determination of density of various fibres
3. Determination of denier of synthetic fibres
4. Determination of moisture regain and moisture content of fibres
5. Determination of wax content and spin finish of natural and synthetic fibres
6. Identification of fibres and determination of the blend proportion of
   a. Cotton/ regenerated cellulose
   b. Polyester/ protein fibres
   c. Cellulose/polyester fibres
   d. Cotton/ viscose/polyester
7. Viscosity and molecular weight determination
8. Analysis of Thermograms of fibers
9. Analysis of FTIR spectrograms of fibers
10. Coagulation of polymers in wet spinning
    a. Viscose
    b. Acrylic
11. Analysis of XRD patterns of various fibre

TOTAL: 30 PERIODS

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

- CO1: Identify the fibres using solubility test
- CO2: Identify the fibres using burning test
- CO3: Identify the fibres using microscopic characterization
- CO4: Determine of linear density, density and moisture properties of fibres
- CO5: Analyze the results of TGA, FTIR spectrometer and X-ray diffractometer
LAB EQUIPMENTS

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS

1. Microscope – 1 No.
2. Weighing balance – 1 No.
3. Conditioning Chamber – 1 No.
4. Viscometer – 1 No.

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OBJECTIVES:

To be proficient in important Microsoft Office tools: MS WORD, EXCEL, POWERPOINT.

- To be proficient in using MS WORD to create quality technical documents, by using standard templates, widely acceptable styles and formats, variety of features to enhance the presentability and overall utility value of content.

- To be proficient in using MS EXCEL for all data manipulation tasks including the common statistical, logical, mathematical etc., operations, conversion, analytics, search and explore, visualize, interlink, and utilizing many more critical features offered.

- To be able to create and share quality presentations by using the features of MS PowerPoint, including: organization of content, presentability, aesthetics, using media elements and enhance the overall quality of presentations.

MS WORD:

Create and format a document
Working with tables
Working with Bullets and Lists
Working with styles, shapes, smart art, charts
Inserting objects, charts and importing objects from other office tools
Creating and Using document templates
Inserting equations, symbols and special characters
Working with Table of contents and References, citations
Insert and review comments
Create bookmarks, hyperlinks, endnotes footnote
Viewing document in different modes
Working with document protection and security

10 Hours
MS EXCEL: 10 Hours
Create worksheets, insert and format data
Work with different types of data: text, currency, date, numeric etc.
Split, validate, consolidate, Convert data
Sort and filter data
Perform calculations and use functions: (Statistical, Logical, Mathematical, date, Time etc.,)
Work with Lookup and reference formulae
Create and Work with different types of charts
Use pivot tables to summarize and analyse data
Perform data analysis using own formulae and functions
Combine data from multiple worksheets using own formulae and built-in functions to generate results
Export data and sheets to other file formats
Working with macros
Protecting data and Securing the workbook

MS POWERPOINT: 10 Hours
Select slide templates, layout and themes
Formatting slide content and using bullets and numbering
Insert and format images, smart art, tables, charts
Using Slide master, notes and handout master
Working with animation and transitions
Organize and Group slides
Import or create and use media objects: audio, video, animation
Perform slideshow recording and Record narration and create presentable videos

TOTAL: 30 PERIODS

OUTCOMES:
On successful completion the students will be able to

- Use MS Word to create quality documents, by structuring and organizing content for their day to day technical and academic requirements
- Use MS EXCEL to perform data operations and analytics, record, retrieve data as per requirements and visualize data for ease of understanding
- Use MS PowerPoint to create high quality academic presentations by including common tables, charts, graphs, interlinking other elements, and using media objects.
OBJECTIVE:
- To enable the students to learn about the raw materials & purification of intermediates for dyes preparation
- To explain the students about the basic chemistry and mechanism in dye & dye intermediates preparation

UNIT I INTRODUCTION TO DYSES
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.

OUTCOMES:
Upon completion of the course, the students will be able to understand about
CO:1 Colour and Chemical Constitution
CO:2 Unit processes in organic synthesis
CO:3 Aromatic Intermediates
CO:4 Dyes and their intermediates
CO: 5 Chemistry and preparation of Dyes.

TEXT BOOKS:

REFERENCES:
OBJECTIVES:
- To make the students understand the principle and method of working of equipment’s used for testing of textile materials

UNIT I
SAMPLING AND FIBRE TESTING

UNIT II
YARN TESTING
Yarn testing - yarn numbering, twist in single and ply yarns, single yarn strength, lea strength, yarn mass evenness, yarn hairiness; yarn friction– static and dynamic; standards and norms

UNIT III
TESTING OF FABRIC MECHANICAL PROPERTIES -
Fabric testing - tensile, tear, bursting strength, ballistic impact, Low stress mechanical properties - Kawabata Evaluation System; FAST; standards and norms

UNIT IV
TESTING OF SERVICEABILITY OF FABRICS
Test procedure - abrasion resistance, pilling resistance, stiffness, drape ability, crease recovery, wrinkle recovery, air permeability; standards and norms

UNIT V
FABRIC INSPECTION AND GARMENT QUALITY
Fabric defects – inspection and grading, acceptable quality level; quality assessment of garments - cutting, sewing, pressing, finishing and packaging defects; standards

OUTCOMES:
Upon completion of this course, the student will be able to
CO1: Explain the sampling procedure for testing of textile materials and test procedure for various properties of fibres
CO2: Explain the testing of various properties yarn properties
CO3: Describe test procedure for fabric mechanical properties
CO4: Explain the test procedure for serviceable properties of fabric
CO5: Describe the fabric inspection methods and quality assessments of garment

TOTAL: 45 PERIODS

TEXTBOOKS
REFERENCES


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<th>Course Outcomes</th>
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<td>Discuss the testing of various yarn properties</td>
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<td>CO3</td>
<td>Describe various test procedure for fabric mechanical and aesthetic related properties</td>
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<td>Explain the test procedure for determining low stress mechanical properties of fabric</td>
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1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively.
OBJECTIVE:

- To expose the students to 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 have thorough knowledge on the
CO1: Chemical Kinetics
CO2: Adsorptions and Catalysis
CO3: Electrochemistry related to textiles
CO4: Fiber properties and Its Effect On dyeing
CO5: Factors Influencing Dyeing

TEXT BOOKS:

REFERENCES:
TC3403  DYEING OF CELLULOSIC AND PROTEIN MATERIALS  L T P C

3 0 0 3

OBJECTIVE:
- To provide the knowledge on theory of dyeing fibrous material
- To provide the knowledge on classification, principle, shop floor practice & problems in the application of various dyes on textiles
- To enable the students to understand machinery used for dyeing of textile materials.

UNIT I  INTRODUCTION  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 AND REACTIVE DYES  9
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  VAT DYES, OXIDATION COLOURS AND PIGMENTS  9

UNIT IV  ACID DYES  9

UNIT V  BASIC AND METAL COMPLEX DYES  9
Basic Dyes: Dyeing mechanism with protein fibres – application procedure of silk and wool

**TOTAL: 45 PERIODS**

**OUTCOMES:**
Upon completion of the course, the students will be able to understand the
- CO1: Theory of dyeing
- CO2: Process of dyeing of cellulosic textiles with Direct and reactive dyes
- CO3: Process of dyeing of cellulosic textiles with vat dyes, oxidation colours and Pigments
- CO4: Process of dyeing of synthetic textiles with Acid dyes
- CO5: Process of dyeing of synthetic textiles with Basic and Metal complex dyes

**TEXT BOOKS:**

**REFERENCES:**

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**TC3404**

**TECHNOLOGY OF PRINTING**

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

**UNIT I**

**CONCEPTS OF PRINTING**
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  
**THICKENERS**
9

UNIT III  
**DIRECT STYLE**
9
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  
**DISCHARGE, RESIST STYLES**
9

UNIT V  
**PRINTING MACHINERYS**
9

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to understand the
CO:1 Concepts of printing of fabrics
CO:2 Different types of thickeners and printing with pigments
CO:3 Concepts of Direct Style of printing
CO:4 Concepts Discharge and Resist of printing.
CO:5 Operation of different Printing machinery and Printing of silk and woolen materials

TEXT BOOKS:

REFERENCES:
UNIT I  ENVIRONMENT AND BIODIVERSITY

UNIT II  ENVIRONMENTAL POLLUTION

UNIT III  RENEWABLE SOURCES OF ENERGY
Energy management and conservation, New Energy Sources: Need of new sources. Different types new energy sources. Applications of- Hydrogen energy, Ocean energy resources, Tidal energy conversion. Concept, origin and power plants of geothermal energy.

UNIT IV  SUSTAINABILITY AND MANAGEMENT
Development , GDP ,Sustainability- concept, needs and challenges-economic, social and aspects of sustainability-from unsustainability to sustainability-millennium development goals,and protocols-Sustainable Development Goals-targets, indicators and intervention areas Climate change- Global, Regional and local environmental issues and possible solutions-case studies. Concept of Carbon Credit, Carbon Footprint. Environmental management in industry-A case study.

UNIT V  SUSTAINABILITY PRACTICES

TEXT BOOKS:
5. Bradley. A.S; Adebayo, A.O., Maria, P. Engineering applications in sustainable design and development, Cengage learning.
OBJECTIVE:
- To make the students practically learn various fibre, yarn and fabric evaluation procedures to determine characteristics of fibres, yarn and fabric

LIST OF EXPERIMENTS
Determination of
1. Fibre fineness, length and maturity
2. Fibre trash content, Bundle fibre strength
3. Sliver/roving/ yarn linear density
4. Single yarn strength and Yarn Lea strength
5. Yarn single and ply yarn twist
6. Unevenness of yarn and assessment of yarn appearance
7. Fabric tensile strength,
8. Fabric tear and bursting strength
9. Fabric flexural rigidity, bending modulus and crease recovery
10. Drapeability of fabrics
11. Fabric abrasion and pilling resistance
12. Fabric air permeability
13. Fabric weight, thickness and dimensional stability
14. Seam strength and seam slippage

TOTAL: 45 PERIODS

OUTCOMES:
Upon the completion of this course the student will be able to
CO 1: Measure important characteristics of fibre and yarn
CO2: Determine the important characteristics of fabrics
CO3: Measure the seam strength and slippage of garment

LAB EQUIPMENTS
LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS
Baer Sorter - 1 No.
Fibre Bundle strength tester - 1 No.
Fibre Fineness tester - 1 No.
Trash Analyzer - 1 No.
Projection Microscope - 1 No.
Wrap Reel - 1 No.
Wrap Block - 1 No.
Yarn Twist Tester - 1 No.
Single Yarn Strength Tester - 1 No.
Bundle yarn strength tester - 1 No.
Ballistic Tester - 1 No.
Yarn Unevenness tester - 1 No.
Weighing balance - 1 No.
Yarn appearance Board Winder - 1 No.
Yarn appearance Board (Standards) - 1 No.
Fabric tensile strength tester - 1 No.
Fabric tearing strength tester - 1 No.
Fabric Thickness Tester - 1 No.
Fabric Stiffness Tester - 1 No.
Fabric Crease Recovery Tester - 1 No.
Fabric Bursting Strength Tester - 1 No.
Fabric Abrasion Resistance Tester - 1 No.
Fabric Pilling resistance tester - 1 No.
Fabric air permeability tester - 1 No.
Fabric Drape meter - 1 No.
GSM cutter and weighing balance - 1 No.
Lander-o-meter - 1 No.
Crock meter - 1 No.
## Course Articulation Matrix:

<table>
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<tr>
<th>Course Outcomes</th>
<th>Statement</th>
<th>PO1</th>
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<td>Measure important characteristics of fibre and yarn</td>
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<td>Determine the important characteristics of fabrics</td>
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<td>CO3</td>
<td>Measure the seam strength and slippage of garment</td>
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1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively.
REFERENCES:

TC3411 WET PROCESSING PREPARATION LABORATORY L T P C 0 0 3 1.5

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

LIST OF EXPERIEMENTS
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 of silk.
13. Scouring and Bleaching of wool using hydrogen peroxide.

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of this practical course, the students would be able to
- CO1: Desize the fabric and Efficiency of fabric evaluate the efficiency
- CO2: Scoure the fabric
- CO3: Bleach the fabric and estimate efficiency of process
- CO4: Carryout combined scouring and Bleaching
- CO5: Carryout scouring and Bleaching of synthetic fabrics

LAB EQUIPMENTS

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

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TC3412 TEXTILE CHEMICAL ANALYSIS LABORATORY

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

LIST OF EXPERIEMENTS
1. Estimation of the Efficiency of the wetting agent.
2. Estimation of strength of oxidizing agent.
3. Estimation of strength of reducing agent.
4. Estimation of strength of dispersing agent.
5. Estimation of strength of Optical Brightening agent.
6. Demonstration of UV-VIS spectrophotometer and instruments of working principles.
7. Evaluation of the inorganic substances in Textile processing.
8. Identification of dye powder.
9. Identification of the dye in the dyed fabric
10. Determination of Viscosity of liquid samples by using viscometer.
11. Evaluation of the finishing chemicals

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of this practical course, the students would be able to

CO1: Estimate different types of chemicals used for wet processing of textile materials.
CO2: Understand the UV-VIS spectrophotometer process
CO3: Evaluate the inorganic substances
CO4: Identify the dyes
CO5: Estimate purity of dye solution.

LAB EQUIPMENTS

LIST OF EQUIPMENT 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.
6. Viscometer – 1 No.
7. UV-Vis spectrophotometer – 1 No.

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