**ANNA UNIVERSITY, CHENNAI**
**NON-AUTONOMOUS COLLEGES AFFILIATED TO ANNA UNIVERSITY**
**REGULATIONS 2021**
**B. TECH. FASHION TECHNOLOGY**
**CHOICE BASED CREDIT SYSTEM**
**I TO II SEMESTERS CURRICULA AND SYLLABUS**

**SEMESTER I**

| S. No. | COURSE CODE | COURSE TITLE | CATE-GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| 1. | IP3151 | Induction Programme | - | - | - | - | - | 0 |
| **THEORY** | | | | | | | | |
| 2. | HS3151 | Professional English - I | HSMC | 3 | 1 | 0 | 4 | 4 |
| 3. | MA3151 | Matrices and Calculus | BSC | 3 | 1 | 0 | 4 | 4 |
| 4. | PH3151 | Engineering Physics | BSC | 3 | 0 | 0 | 3 | 3 |
| 5. | CY3151 | Engineering Chemistry | BSC | 3 | 0 | 0 | 3 | 3 |
| 6. | GE3151 | Problem Solving and Python Programming | ESC | 3 | 0 | 0 | 3 | 3 |
| **PRACTICALS** | | | | | | | | |
| 7. | GE3171 | Problem Solving and Python Programming Laboratory | ESC | 0 | 0 | 4 | 4 | 2 |
| 8. | BS3171 | Physics and Chemistry Laboratory | BSC | 0 | 0 | 4 | 4 | 2 |
| | | | **TOTAL** | **15** | **2** | **8** | **25** | **21** |

**SEMESTER II**

| SI. NO. | COURSE CODE | COURSETITLE | CATE-GORY | PERIODS PERWEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| **THEORY** | | | | | | | | |
| 1. | HS3251 | Professional English - II | HSMC | 3 | 1 | 0 | 4 | 4 |
| 2. | MA3251 | Statistics and Numerical Methods | BSC | 3 | 1 | 0 | 4 | 4 |
| 3. | FT3201 | Fibre Science | PCC | 3 | 0 | 0 | 3 | 3 |
| 4. | BE3252 | Basic Electrical, Electronics and Instrumentation Engineering | ESC | 3 | 0 | 0 | 3 | 3 |
| 5. | GE3251 | Engineering Graphics | ESC | 2 | 0 | 4 | 6 | 4 |
| 6. | CY3252 | Chemistry for Textile Technologists | BSC | 3 | 0 | 0 | 3 | 3 |
| 7. | | NCC Credit Course Level 1* | - | 2 | 0 | 0 | 2 | 2 |
| **PRACTICALS** | | | | | | | | |
| 8. | GE3271 | Engineering Practices Laboratory | ESC | 0 | 0 | 4 | 4 | 2 |
| 9. | BE3272 | Basic Electrical, Electronics and Instrumentation Engineering Laboratory | ESC | 0 | 0 | 4 | 4 | 2 |
| | | | **TOTAL** | **17** | **2** | **12** | **31** | **25** |

*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.

**IP3151** **INDUCTION PROGRAMME**

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 dont's, 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 under privileged.

(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 L T P C**

**3 1 0 4**

**COURSE OBJECTIVES:**

- To improve the communicative competence of learners
- To help learners use language effectively in academic /work contexts
- To build on students' English language skills by engaging them in listening, speaking and grammar learning activities that are relevant to authentic contexts.
- To develop learners' ability to read and write complex texts, summaries, articles, blogs, definitions, essays and user manuals.
- To use language efficiently in expressing their opinions via various media.

**INTRODUCTION TO EFFECTIVE COMMUNICATION 1**

- What is effective communication? (There are many interesting activities for this.)
- 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 11**

**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** - Self Introduction; Introducing a friend; Conversation - politeness strategies; Telephone conversation; Leave a voicemail; Leave a message with another person; asking for information to fill details in a form. **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 12**

**Listening** - Listening to podcast, anecdotes / stories / event narration; documentaries and interviews with celebrities. **Speaking -** Narrating personal experiences / events; Interviewing a celebrity; Reporting / and summarizing of documentaries / podcasts/ interviews. **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 12**

**Listening** - Listen to a product and process descriptions; a classroom lecture; and advertisements about a products. **Speaking** – Picture description; giving instruction to use the product; Presenting a product; and summarizing a lecture**. 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 12**

**Listening** – Listening to TED Talks; Scientific lectures; and educational videos. **Speaking** – Small Talk; Mini presentations and making recommendations. **Reading** – Newspaper articles; Journal reports –and Non Verbal Communication (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 12**

**Listening** – Listening to debates/ discussions; different viewpoints on an issue; and panel discussions. **Speaking** –group discussions, Debates, and Expressing opinions through Simulations & Role play. **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.

**TOTAL: 60 PERIODS**

**COURSE OUTCOMES:**

At the end of the course, learners will be able

CO1 : To listen and comprehend complex academic texts
CO2 : To read and infer the denotative and connotative meanings of technical texts
CO3 : To write definitions, descriptions, narrations and essays on various topics
CO4 : To speak fluently and accurately in formal and informal communicative contexts
CO5 : To express their opinions effectively in both oral and written medium of communication

**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.

**REFERENCES:**

1. Technical Communication – Principles And Practices By Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2016, New Delhi.
2. A Course Book on Technical English By Lakshmi Narayanan, Scitech Publications (India) Pvt. Ltd.
3. English For Technical Communication (With CD) By Aysha Viswamohan, Mcgraw Hill Education, ISBN : 0070264244.
4. Effective Communication Skill, Kulbhusan Kumar, R S Salaria, Khanna Publishing House.Learning to Communicate – Dr. V. Chellammal, Allied Publishing House, New Delhi,2003.

**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**

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley - Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms – Applications : Stretching of an elastic membrane.

**UNIT II DIFFERENTIAL CALCULUS 9+3**

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Implicit differentiation - Logarithmic differentiation - Applications : Maxima and Minima of functions of one variable.

**UNIT III FUNCTIONS OF SEVERAL VARIABLES 9+3**

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

**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 :**

1. Kreyszig.E, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.
2. Grewal.B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition , 2018.
3. James Stewart, " Calculus : Early Transcendentals ", Cengage Learning, 8th Edition, New Delhi, 2015. [For Units II & 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 :**

1. Anton. H, Bivens. I and Davis. S, " Calculus ", Wiley, 10th Edition, 2016
2. Bali. N., Goyal. M. and Watkins. C., " Advanced Engineering Mathematics ", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
3. Jain . R.K. and Iyengar. S.R.K., " Advanced Engineering Mathematics ", Narosa Publications, New Delhi, 5th Edition, 2016.
4. Narayanan. S. and Manicavachagom Pillai. T. K., " Calculus " Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.
5. Ramana. B.V., " Higher Engineering Mathematics ", McGraw Hill Education Pvt. Ltd, New Delhi, 2016.
6. Srimantha Pal and Bhunia. S.C, " Engineering Mathematics " Oxford University Press, 2015.
7. Thomas. G. B., Hass. J, and Weir. M.D, " Thomas Calculus ", 14th Edition, Pearson India, 2018.

**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 be successfully understand the importance of quantum physics.
- To motivate the students towards the applications of quantum mechanics.

**UNIT I MECHANICS 9**

Multi-particle dynamics: Center of mass (CM) – CM of continuous bodies – motion of the CM – kinetic energy of system of particles. Rotation of rigid bodies: Rotational kinematics – rotational kinetic energy and moment of inertia - theorems of M .I –moment of inertia of continuous bodies – M.I of a diatomic molecule - torque – rotational dynamics of rigid bodies – conservation of angular momentum – rotational energy state of a rigid diatomic molecule - gyroscope - torsional pendulum – double pendulum –Introduction to nonlinear oscillations.

**UNIT II ELECTROMAGNETIC WAVES 9**

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 9**

Simple harmonic motion - resonance –analogy between electrical and mechanical oscillating systems - waves on a string - standing waves - traveling waves - Energy transfer of a wave - sound waves - Doppler effect. Reflection and refraction of light waves - total internal reflection - interference –Michelson interferometer –Theory of air wedge and experiment. Theory of laser - characteristics - Spontaneous and stimulated emission - Einstein's coefficients - population inversion - Nd-YAG laser, $CO_2$ laser, semiconductor laser –Basic applications of lasers in industry.

**UNIT IV BASIC QUANTUM MECHANICS 9**

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 9**

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:**

1. D.Kleppner and R.Kolenkow. An Introduction to Mechanics. McGraw Hill Education (Indian Edition), 2017.
2. E.M.Purcell and D.J.Morin, Electricity and Magnetism, Cambridge Univ.Press, 2013.
3. Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, Concepts of Modern Physics, McGraw-Hill (Indian Edition), 2017.

**REFERENCES:**

1. R.Wolfson. Essential University Physics. Volume 1 & 2. Pearson Education (Indian Edition), 2009.
2. Paul A. Tipler, Physic – Volume 1 & 2, CBS, (Indian Edition), 2004.
3. K.Thyagarajan and A.Ghatak. Lasers: Fundamentals and Applications, Laxmi Publications, (Indian Edition), 2019.
4. D.Halliday, R.Resnick and J.Walker. Principles of Physics, Wiley (Indian Edition), 2015.
5. N.Garcia, A.Damask and S.Schwarz. Physics for Computer Science Students. Springer-Verlag,

**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 9**

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 water treatment: primary treatment and disinfection (UV, Ozonation, break-point chlorination). Desalination of brackish water: Reverse Osmosis. Boiler troubles: Scale and sludge, Boiler corrosion, Caustic embrittlement, Priming &foaming. Treatment of boiler feed water: Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) and External treatment – Ion exchange demineralization and zeolite process.

**UNIT II NANOCHEMISTRY 9**

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 9**

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 9**

Fuels: Introduction: Classification of fuels; Coal and coke: Analysis of coal (proximate and ultimate), Carbonization, Manufacture of metallurgical coke (Otto Hoffmann method). Petroleum and Diesel: Manufacture of synthetic petrol (Bergius process), Knocking - octane number, diesel oil - cetane number; Power alcohol and biodiesel.

Combustion of fuels: Introduction: Calorific value - higher and lower calorific values, Theoretical calculation of calorific value; Ignition temperature: spontaneous ignition temperature, Explosive range; Flue gas analysis - ORSAT Method. $CO_2$ emission and carbon foot print.

**UNIT V ENERGY SOURCES AND STORAGE DEVICES 9**

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: $H_2$-$O_2$ fuel cell, microbial fuel cell; Supercapacitors: Storage principle, types and examples.

**TOTAL: 45 PERIODS**

**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:**

1. P. C. Jain and Monica Jain, “Engineering Chemistry”, 17th Edition, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2018.
2. Sivasankar B., “Engineering Chemistry”, Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2008.
3. S.S. Dara, “A Text book of Engineering Chemistry”, S. Chand Publishing, 12th Edition, 2018.

**REFERENCES:**

1. B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, “Text book of nanoscience and nanotechnology”, Universities Press-IIM Series in Metallurgy and Materials Science, 2018.
2. O.G. Palanna, “Engineering Chemistry” McGraw Hill Education (India) Private Limited, 2nd Edition, 2017.
3. Friedrich Emich, “Engineering Chemistry”, Scientific International PVT, LTD, New Delhi, 2014.

4. ShikhaAgarwal, “Engineering Chemistry-Fundamentals and Applications”, Cambridge University Press, Delhi, Second Edition, 2019.
5. O.V. Roussak and H.D. Gesser, Applied Chemistry-A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2nd Edition, 2013.

**GE3151 PROBLEM SOLVING AND PYTHON PROGRAMMING L T P C**
**3 0 0 3**

**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 9**

Fundamentals of Computing – Identification of Computational Problems -Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

**UNIT II DATA TYPES, EXPRESSIONS, STATEMENTS 9**

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 9**

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 9**

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 methods; advanced list processing - list comprehension; Illustrative programs: simple sorting, histogram, Students marks statement, Retail bill preparation.

**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:**

1. Allen B. Downey, “Think Python : How to Think like a Computer Scientist”, 2nd Edition, O’Reilly Publishers, 2016.
2. Karl Beecher, “Computational Thinking: A Beginner's Guide to Problem Solving and programming”, 1st Edition, BCS Learning & Development Limited, 2017.

**REFERENCES:**

1. Paul Deitel and Harvey Deitel, “Python for Programmers”, Pearson Education, 1st Edition, 2021.
2. G Venkatesh and Madhavan Mukund, “Computational Thinking: A Primer for Programmers and Data Scientists”, 1st Edition, Notion Press, 2021.
3. John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data‘‘, Third Edition, MIT Press , 2021
4. Eric Matthes, “Python Crash Course, A Hands - on Project Based Introduction to Programming”, 2nd Edition, No Starch Press, 2019.
5. https://www.python.org/
6. Martin C. Brown, “Python: The Complete Reference”, 4th Edition, Mc-Graw Hill, 2018.

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

**OBJECTIVES:**

- To understand the problem solving approaches.
- To learn the basic programming constructs in Python.
- To practice various computing strategies for Python-based solutions to real world problems.
- To use Python data structures - lists, tuples, dictionaries.
- 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)
11. Exploring Pygame tool.
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:**

1. Allen B. Downey, "Think Python : How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.
2. Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and Programming", 1st Edition, BCS Learning & Development Limited, 2017.

**REFERENCES:**

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
2. G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021.
3. John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data‘‘, Third Edition, MIT Press , 2021
4. Eric Matthes, "Python Crash Course, A Hands - on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.
5. https://www.python.org/
6. Martin C. Brown, "Python: The Complete Reference", 4th Edition, Mc-Graw Hill, 2018.

**BS3171** **PHYSICS AND CHEMISTRY LABORATORY** **L T P C**
**0 0 4 2**

## 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
10. Post office box -Determination of Band gap of a semiconductor.
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 $Na_2CO_3$ 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.
12. Estimation of sodium /potassium present in water using flame photometer.
13. Preparation of nanoparticles ($TiO_2$/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 BOOKS :**

1. J. Mendham, R. C. Denney, J.D. Barnes, M. Thomas and B. Sivasankar, Vogel's Textbook of Quantitative Chemical Analysis (2009).

**HS3251 PROFESSIONAL ENGLISH - II L T P C**
**3 1 0 4**

**COURSE OBJECTIVES**

- To engage learners in meaningful language activities to improve their LSRW skills
- To enhance learners' awareness of general rules of writing for specific audiences
- 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 12**

**Listening** – Evaluative Listening: Advertisements, Product Descriptions, -Audio / video; Listening and filling a Graphic Organiser (Choosing a product or service by comparison). **Speaking** – Marketing a product, Persuasive Speech Techniques. **Reading** - Reading advertisements, user manuals, brochures; **Writing** – Professional emails, Email etiquette - Compare and Contrast Essay; **Grammar** – Mixed Tenses, Prepositional phrases. **Vocabulary** – Contextual meaning of words

**UNIT II EXPRESSING CAUSAL RELATIONS IN SPEAKING AND WRITING 12**

**Listening** - Listening to longer technical talks and completing– gap filling exercises. Listening technical information from podcasts – Listening to process/event descriptions to identify cause & effects - **Speaking** – Describing and discussing the reasons of accidents or disasters based on news reports. **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 **Vocabulary** – Word Formation (Noun-Verb-Adj-Adv), Adverbs.

**UNIT III PROBLEM SOLVING 12**

**Listening** – Listening to / Watching movie scenes/ documentaries depicting a technical problem and suggesting solutions. **Speaking** – Group Discussion (based on case studies), - techniques and Strategies, **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. **Vocabulary** - Compound Words, Sentence Completion.

**UNIT IV REPORTING OF EVENTS AND RESEARCH 12**

**Listening** – Listening Comprehension based on news reports – and documentaries – Precis writing, Summarising, **Speaking** –Interviewing, Presenting an oral report, Mini presentations on select topics; **Reading** –Newspaper articles; **Writing** – Recommendations, Transcoding, Accident Report, Survey Report **Grammar** – Reported Speech, Modals **Vocabulary** – Conjunctions- use of prepositions

**UNIT V THE ABILITY TO PUT IDEAS OR INFORMATION COGENTLY 12**

**Listening** – Listening to TED Talks, Presentations, Formal job interviews, (analysis of the interview performance); **Speaking** – Participating in a Role play, (interview/telephone interview), virtual interviews, Making presentations with visual aids; **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 **Vocabulary** – Idioms.

**TOTAL : 60 PERIODS**

**COURSE OUTCOMES:**

At the end of the course, learners will be able

CO1 : To compare and contrast products and ideas in technical texts.

CO2 : To identify cause and effects in events, industrial processes through technical texts

CO3 : To analyze problems in order to arrive at feasible solutions and communicate them orally and in the written format.

CO4 : To report events and the processes of technical and industrial nature.

CO5 : To present their opinions in a planned and logical manner, and draft effective resumes in context of job search.

**TEXT BOOKS**

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

**REFERENCES**


1. Raman. Meenakshi, Sharma. Sangeeta (2019). Professional English. Oxford university press. New Delhi.
2. Improve Your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, 2001, New Delhi.
3. Learning to Communicate – Dr. V. Chellammal. Allied Publishers, New Delhi, 2003
4. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., 2001, New Delhi.
5. Developing Communication Skills by Krishna Mohan, Meera Bannerji- Macmillan India Ltd. 1990, Delhi.


**MA3251 STATISTICS AND NUMERICAL METHODS L T P C**
**3 1 0 4**

**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 9+3**

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 9+3**

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 9+3**

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

**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**

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

**TOTAL: 60 PERIODS**

**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.
- Understandthe 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:**

1. Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.
2. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

**REFERENCES:**

1. Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
2. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.
3. Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi, 7th Edition, 2007.
4. Gupta S.C. and Kapoor V. K., " Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12th Edition, 2020.
5. Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outlines on Probability and Statistics ", Tata McGraw Hill Edition, 4th Edition, 2012.
6. Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education, Asia, 2010.

**FT3201 FIBRE SCIENCE L T P C**
**3 0 0 3**

**COURSE OBJECTIVES**

- To enable the students to learn about the types of fibre and its properties

**UNIT I INTRODUCTION TO TEXTILE FIBRES 9**

Definition of various forms of textile fibres - staple fibre, filament, bicomponent fibres. Classification of Natural and Man-made fibres, essential and desirable properties of Fibres. Production and cultivation of Natural Fibers: Cotton, Silk, Wool -Physical and chemical structure of the above fibres.

**UNIT II REGENERATED FIBRES 9**

Production Sequence of Regenerated Cellulosic fibres: Viscose Rayon, Acetate rayon – High wet modulus fibres: Modal and Lyocel ,Tencel

**UNIT III SYNTHEITC FIBRES 9**

Production Sequence of Synthetic Fibers: polymer-Polyester, Nylon, Acrylic and polypropylene. Mineral fibres: fibre glass ,carbon .Introduction to spin finishes and texturization

**UNIT IV SPECIALITY FIBRES 9**

Properties and end uses of high tenacity and high modulus fibres, high temperature and flame retardant fibres, Chemical resistant fibres

**UNIT V FUNCTIONAL SPECIALITY FIBRES 9**

**Properties and end uses :** Fibres for medical application – Biodegradable fibres based on PLA ,Super absorbent fibres elastomeric fibres, ultra-fine fibres, electrospun nano fibres, metallic fibres – Gold and Silver coated.

**TOTAL : 45 PERIODS**

**COURSE OUTCOMES**

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

- Understand the process sequence of various fibres
- Understand the properties of various fibres

**TEXT BOOKS:**

1. Morton W. E., and Hearle J. W. S., “Physical Properties of Textile Fibres”, The Textile Institute, Washington D.C., 2008, ISBN 978-1-84569-220-95
2. Meredith R., and Hearle J. W. S., “Physical Methods of Investigation of Textiles”, Wiley Publication, New York, 1989, ISBN: B00JCV6ZWU | ISBN-13:
3. Mukhopadhyay S. K., “Advances in Fibre Science”, The Textile Institute,1992, ISBN: 1870812379

**REFERENCES:**

1. Meredith R., “Mechanical Properties of Textile Fibres”, North Holland, Amsterdam, 1986, ISBN: 1114790699, ISBN-13: 9781114790698
2. Hearle J. W. S., Lomas B., and Cooke W. D., “Atlas of Fibre Fracture and Damage to Textiles”, The Textile Institute, 2nd Edition, 1998, ISBN: 1855733196.
3. Raheel M. (ed.)., “Modern Textile Characterization Methods”, Marcel Dekker, 1995, ISBN:0824794737
4. Mukhopadhyay. S. K., “The Structure and Properties of Typical Melt Spun Fibres”, Textile Progress, Vol. 18, No. 4, Textile Institute, 1989, ISBN: 1870812115
5. Hearle J.W.S., “Polymers and Their Properties: Fundamentals of Structures and Mechanics Vol 1”, Ellis Horwood, England, 1982, ISBN: 047027302X | ISBN-13: 9780470273029 36

| BE3252 | BASIC ELECTRICAL, ELECTRONICS AND INSTRUMENTATION ENGINEERING | L T P C 3 0 0 3 |
|---|---|---|

**OBJECTIVES :**

- To introduce the basics of electric circuits and analysis
- To impart knowledge in domestic wiring
- To impart knowledge in the basics of working principles and application of electrical machines
- To introduce analog devices and their characteristics
- To introduce the functional elements and working of sensors and transducers.

**UNIT I ELECTRICAL CIRCUITS 9**

DC Circuits: Circuit Components: Conductor, Resistor, Inductor, Capacitor – Ohm's Law - Kirchhoff's Laws – Simple problems- Nodal Analysis, Mesh analysis with Independent sources only (Steady state)

Introduction to AC Circuits and Parameters: Waveforms, Average value, RMS Value, Instantaneous power, real power, reactive power and apparent power, power factor – Steady state analysis of RLC circuits (Simple problems only), Three phase supply – star and delta connection – power in three-phase systems

**UNIT II MAGNETIC CIRCUITS AND ELECTRICAL INSTALLATIONS 9**

Magnetic circuits-definitions-MMF, flux, reluctance, magnetic field intensity, flux density, fringing, self and mutual inductances-simple problems.

Domestic wiring , types of wires and cables, earthing ,protective devices- switch fuse unit-Miniature circuit breaker-moulded case circuit breaker- earth leakage circuit breaker, safety precautions and First Aid

.

**UNIT III ELECTRICAL MACHINES 9**

Construction and Working principle- DC Separately and Self excited Generators, EMF equation, Types and Applications. Working Principle of DC motors, Torque Equation, Types and Applications. Construction, Working principle and Applications of Transformer, Three phase Alternator, Synchronous motor and Three Phase Induction Motor.

**UNIT IV ANALOG ELECTRONICS 9**

Resistor, Inductor and Capacitor in Electronic Circuits- Semiconductor Materials: Silicon &Germanium – PN Junction Diodes, Zener Diode –Characteristics Applications – Bipolar Junction Transistor-Biasing, JFET, SCR, MOSFET,IGBT – Types, I-V Characteristics and Applications, Rectifier and Inverters, harmonics

**UNIT V SENSORS AND TRANSDUCERS 9**

Sensors, solenoids, pneumatic controls with electrical actuator, mechatronics, types of valves and its applications, electro-pneumatic systems, proximity sensors, limit switches, piezoelectric, hall effect, photo sensors,Strain gauge, LVDT, differential pressure transducer,optical and digital transducers, Smart sensors, Thermal Imagers.

**TOTAL : 45 PERIODS**

**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:**

1. D P Kothari and I.J Nagarath, "Basic Electrical and Electronics Engineering", McGraw Hill Education (India) Private Limited, Second Edition, 2020
2. A.K. Sawhney, Puneet Sawhney 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, 2015.
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:**

1. John Bird, "Electrical Circuit theory and technology", Routledge; 2017.
2. Thomas L. Floyd, 'Electronic Devices', 10th Edition, Pearson Education, 2018.
3. Albert Malvino, David Bates, 'Electronic Principles, McGraw Hill Education; 7th edition, 2017
4. Muhammad H.Rashid, "Spice for Circuits and electronics", 4th Edition.,Cengage India,2019.
5. H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw-Hill, New Delhi, 2010

**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:

- Drawing engineering curves.
- Drawing freehand sketch of simple objects.
- Drawing orthographic projection of solids and section of solids.
- Drawing development of solids
- 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 AND FREEHAND SKETCHING 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.

**UNIT III PROJECTION OF SOLIDS 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)

**TOTAL: (L=30+P=60) 90 PERIODS**

**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 BOOKS:**

1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2019.
2. Natrajan K.V., "A Text Book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2018.
3. Parthasarathy, N. S. and Vela Murali, "Engineering Drawing", Oxford University Press, 2015

**REFERENCES:**

1. Basant Agarwal and Agarwal C.M., "Engineering Drawing", McGraw Hill, 2nd Edition, 2019.
2. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Publications, Bangalore, 27th Edition, 2017.
3. Luzzader, Warren.J. and Duff,John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
4. Parthasarathy N. S. and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015.
5. Shah M.B., and Rana B.C., "Engineering Drawing", Pearson Education India, 2nd Edition, 2009.
6. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.

**Publication of** Bureau of Indian Standards:

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

**Special points applicable to University Examinations on Engineering Graphics:**

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

**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 9**

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 9**

Interface region-curved interfaces-thermodynamics of surfaces - Surface film on liquids-Adsorption of gases on Solids-adsorption isotherms – types. Applications of adsorption studies-detergency, wetting, foaming , de foaming, spreading, water repellency.

**UNIT III WATER TECHNOLOGY 9**

**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 9**

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 9**

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:**

1. Dhara S. S., “A Text Book of Engineering Chemistry”, 12th Ed., S. Chand & Co. Ltd., New Delhi, 2016.
2. Jain. P.C. and Monica Jain, “Engineering Chemistry”, Dhanpet Rai & Sons, New Delhi, 17th Edition, 2018.
3. Shikha Agarwal, “Engineering Chemistry-Fundamentals and Applications”, Cambridge University Press, Delhi, 2019.

**REFERENCES:**

1. B.K. Sharma, “Industrial chemistry”, Krishna Prakashan Media (P) Ltd, Meerut, 2014.
2. Shore J., “Colourants and Auxiliaries: 2nd Edition, Volume 1 & 2, Wood head Publishing Ltd., 2002.
3. Shenai V. A., “Chemistry of Dyes and Principles of Dyeing”, Sevak Publications, Mumbai, 1995.
4. Trotman E. R., “Dyeing and Chemical Technology of Textile Fibres”, B.Y Publishing Pvt. Ltd., New Delhi, 1994.

## NCC Credit Course Level 1*

| NX3251 | (ARMY WING) NCC Credit Course Level - I | L T P C<br>2 0 0 2 |
|---|---|---|

| | | |
|---|---|---|
| **NCC GENERAL** | | **6** |
| NCC 1 | Aims, Objectives & Organization of NCC | 1 |
| NCC 2 | Incentives | 2 |
| NCC 3 | Duties of NCC Cadet | 1 |
| NCC 4 | NCC Camps: Types & Conduct | 2 |
| **NATIONAL INTEGRATION AND AWARENESS** | | **4** |
| NI 1 | National Integration: Importance & Necessity | 1 |
| NI 2 | Factors Affecting National Integration | 1 |
| NI 3 | Unity in Diversity & Role of NCC in Nation Building | 1 |
| NI 4 | Threats to National Security | 1 |
| **PERSONALITY DEVELOPMENT** | | **7** |
| PD 1 | Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem Solving | 2 |
| PD 2 | Communication Skills | 3 |
| PD 3 | Group Discussion: Stress & Emotions | 2 |
| **LEADERSHIP** | | **5** |
| L 1 | Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour Code | 3 |
| L 2 | Case Studies: Shivaji, Jhasi Ki Rani | 2 |
| **SOCIAL SERVICE AND COMMUNITY DEVELOPMENT** | | **8** |
| SS 1 | Basics, Rural Development Programmes, NGOs, Contribution of Youth | 3 |
| SS 4 | Protection of Children and Women Safety | 1 |
| SS 5 | Road / Rail Travel Safety | 1 |
| SS 6 | New Initiatives | 2 |
| SS 7 | Cyber and Mobile Security Awareness | 1 |

**TOTAL: 30 PERIODS**

## NCC Credit Course Level 1*

| NX3252 | (NAVAL WING) NCC Credit Course Level - I | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 2 |

| | | |
|---|---|---|
| **NCC GENERAL** | | **6** |
| NCC 1 | Aims, Objectives & Organization of NCC | 1 |
| NCC 2 | Incentives | 2 |
| NCC 3 | Duties of NCC Cadet | 1 |
| NCC 4 | NCC Camps: Types & Conduct | 2 |
| **NATIONAL INTEGRATION AND AWARENESS** | | **4** |
| NI 1 | National Integration: Importance & Necessity | 1 |
| NI 2 | Factors Affecting National Integration | 1 |
| NI 3 | Unity in Diversity & Role of NCC in Nation Building | 1 |
| NI 4 | Threats to National Security | 1 |
| **PERSONALITY DEVELOPMENT** | | **7** |
| PD 1 | Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem Solving | 2 |
| PD 2 | Communication Skills | 3 |
| PD 3 | Group Discussion: Stress & Emotions | 2 |
| **LEADERSHIP** | | **5** |
| L 1 | Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour Code | 3 |
| L 2 | Case Studies: Shivaji, Jhasi Ki Rani | 2 |
| **SOCIAL SERVICE AND COMMUNITY DEVELOPMENT** | | **8** |
| SS 1 | Basics, Rural Development Programmes, NGOs, Contribution of Youth | 3 |
| SS 4 | Protection of Children and Women Safety | 1 |
| SS 5 | Road / Rail Travel Safety | 1 |
| SS 6 | New Initiatives | 2 |
| SS 7 | Cyber and Mobile Security Awareness | 1 |

**TOTAL : 30 PERIODS**

**NCC Credit Course Level 1***

| NX3253 | (AIR FORCE WING) NCC Credit Course Level - I | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 2 |

| | | |
|---|---|---|
| **NCC GENERAL** | | **6** |
| NCC 1 | Aims, Objectives & Organization of NCC | 1 |
| NCC 2 | Incentives | 2 |
| NCC 3 | Duties of NCC Cadet | 1 |
| NCC 4 | NCC Camps: Types & Conduct | 2 |
| **NATIONAL INTEGRATION AND AWARENESS** | | **4** |
| NI 1 | National Integration: Importance & Necessity | 1 |
| NI 2 | Factors Affecting National Integration | 1 |
| NI 3 | Unity in Diversity & Role of NCC in Nation Building | 1 |
| NI 4 | Threats to National Security | 1 |
| **PERSONALITY DEVELOPMENT** | | **7** |
| PD 1 | Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem Solving | 2 |
| PD 2 | Communication Skills | 3 |
| PD 3 | Group Discussion: Stress & Emotions | 2 |
| **LEADERSHIP** | | **5** |
| L 1 | Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour Code | 3 |
| L 2 | Case Studies: Shivaji, Jhasi Ki Rani | 2 |
| **SOCIAL SERVICE AND COMMUNITY DEVELOPMENT** | | **8** |
| SS 1 | Basics, Rural Development Programmes, NGOs, Contribution of Youth | 3 |
| SS 4 | Protection of Children and Women Safety | 1 |
| SS 5 | Road / Rail Travel Safety | 1 |
| SS 6 | New Initiatives | 2 |
| SS 7 | Cyber and Mobile Security Awareness | 1 |

**TOTAL : 30 PERIODS**

**GE3271 ENGINEERING PRACTICES LABORATORY LT P C**
**0 0 4 2**

**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 commonhousehold 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 inhousehold 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 15**

**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

**TOTAL : 60 PERIODS**

**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.

| BE3272 | BASIC ELECTRICAL, ELECTRONICS AND INSTRUMENTATION ENGINEERING LABORATORY | L T P C<br>0 0 4 2 |
|---|---|---|

**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

**ANNA UNIVERSITY, CHENNAI**

**NON-AUTONOMOUS COLLEGES AFFILIATED COLLEGES**

**REGULATIONS 2021**

**CHOICE BASED CREDIT SYSTEM (CBCS)**

# B. TECH. FASHION TECHNOLOGY

## PROGRAM EDUCATIONAL OBJECTIVES:

Bachelor of Fashion Technology curriculum is designed to prepare the undergraduates to

1. Have **attitude and knowledge** for the successful **professional and technical career**
2. Have strong foundation in basic **sciences, engineering, management, mathematics and computational platforms**
3. Have **knowledge** on the **theory and practices** in the field of textile based garment manufacturing technology, fashion industry and allied areas
4. Engross in **life-long learning** to keep themselves abreast of new developments, and practice and inspire high **ethical values** and **technical standards**

## PROGRAM OUTCOMES:

The Fashion Technology Graduates will have the ability to

1. Apply knowledge of **mathematics, sciences, engineering, textile and fashion technology** to get **solution** for the **technological problems** in fashion and garment industry
2. Identify, formulate, review literature and **critically analyze the technological problems** in the textile and fashion industry to reach **substantiated conclusion**
3. **Design and develop the solutions** to the **technological and managerial problems** in fashion and garment industry with appropriate consideration for the **public health and safety, and the cultural, societal, and environmental considerations**
4. Use **research-based knowledge and research methods** including **design of experiments, analysis and interpretation of data, and synthesis of the information** to provide **valid conclusions to the technological prob**lems in fashion and textile based garment industry

5. **Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools** for managing garment manufacturing companies with an understanding of the limitations
6. Apply reasoning gained through the contextual knowledge to assess **societal, health, safety, legal and cultural issues and the consequent responsibilities** relevant to the profession
7. Understand the impact of the developed solutions in societal and environmental contexts, and demonstrate the knowledge for **sustainable development**
8. Understand **ethical and professional responsibilities**
9. Function effectively as **an individual, and as a member or leader in diverse teams** in the profession
10. **Communicate effectively** on complex engineering activities with the engineering community and with society at large. Able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage **projects and in multidisciplinary environments**
12. Recognize the need for, and have the preparation and ability to engage in independent and **life-long learning** in the broadest context of technological change.

**PROGRAM SPECIFIC OUTCOMES:**

The Fashion Technology Graduates will have the ability to

1. Understand and **apply fundamental and the technical knowledge** for managing textile based garment and fashion industries.
2. Be a **successful entrepreneur** and execute fashion business in the levels of garment design, development and manufacture.
3. **Design and develop novel products and manufacturing processes** in fashion and Garment fields.

**PEO's – PO's & PSO's MAPPING**

| PEO | PO | | | | | | | | | | | | PSO | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| I | 3 | 3 | 3 | 1 | 2 | 2 | 2 | 3 | 2 | 3 | 2 | 1 | 3 | 3 | 2 |
| II | 3 | 3 | 3 | 3 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 2 | 2 | 1 |
| III | 3 | 3 | 3 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 3 | 3 | 2 |
| IV | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 3 | 1 | 1 | 1 | 3 | 2 | 2 | 2 |

| Year | Semester | Course Name | PO | | | | | | | | | | | | PSO | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **HUMANITIES AND SOCIAL SCIENCES INCLUDING MANAGEMENT COURSES** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **1** | **2** | **3** |
| | I | English for Engineering and Technology - I | | | | | | | | | | | | | | | |
| | II | English for Engineering and Technology - II | | | | | | | | | | | | | | | |
| | VII | Ethics and Human values | | | | | | | | | | | | | | | |
| | VII | Management Elective | | | | | | | | | | | | | | | |
| | | **Basic Science Courses [BSC]** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **1** | **2** | **3** |
| | I | Mathematics – I | | | | | | | | | | | | | | | |
| | I | Engineering Physics | | | | | | | | | | | | | | | |
| | I | Chemistry | | | | | | | | | | | | | | | |
| | I | Physics and Chemistry Laboratory | | | | | | | | | | | | | | | |
| | II | Mathematics – II | | | | | | | | | | | | | | | |
| | II | Physics for Fashion Technologists | | | | | | | | | | | | | | | |
| | II | Chemistry for Textile Technologists | | | | | | | | | | | | | | | |
| | III | Probability and Statistical Methods | | | | | | | | | | | | | | | |
| | IV | Environmental Science and Sustainability | | | | | | | | | | | | | | | |
| | | **ENGINEERING SCIENCE COURSE [ESC]** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **1** | **2** | **3** |
| | I | Programming | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | I | Engineering Graphics | | | | | | | | | | | | | | | |
| | I | Programming Laboratory | | | | | | | | | | | | | | | |
| | II | Basics of Electrical and Electronics Engineering | | | | | | | | | | | | | | | |
| | II | Engineering Practices Laboratory | | | | | | | | | | | | | | | |
| | II | Electrical & Electronics Engineering Laboratory | | | | | | | | | | | | | | | |
| | | **PROFESSIONAL CORE COURSES [PCC]** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **1** | **2** | **3** |
| | II | Fiber science | | | | | | | | | | | | | | | |
| | III | Characteristics of Textile Fibres | 3 | 3 | 3 | 3 | 2 | - | - | - | - | - | - | 2 | 3 | 1 | 2 |
| | III | Technology of Spinning processes | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 3 | 1 | 1 | 3 |
| | III | Fabric Manufacturing | 3 | 2 | 2 | 1 | 2 | - | - | - | - | 1 | 2 | 2 | 3 | - | 2 |
| | III | Fabric Structures | 3 | 2 | 2 | 1 | 2 | - | - | - | - | 1 | 2 | 2 | 3 | - | 2 |
| | III | Concepts and Evolution of Fashion and Design | 1 | 1 | 3 | 3 | 2 | - | - | - | - | - | - | 2 | 3 | 1 | 2 |
| | III | Fabric Structure Laboratory | | | | | | | | | | | | | | | |
| | III | Fashion Illustration Laboratory | 1 | 1 | 1 | 2 | 3 | - | 2 | - | - | 3 | 1 | 2 | 3 | 3 | 3 |
| | IV | Apparel Production Machinery | 1 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | - | 3 | 3 | 3 | 3 |
| | IV | Fabric and Garment Quality Evaluation | 3 | 3 | 1 | 2 | 1 | 2 | 1 | 3 | 1 | 1 | 2 | 2 | 1 | 1 | 2 |
| | IV | Fundamentals of Garment Manufacturing | | | | | | | | | | | | | | | |
| | IV | Pattern Engineering | 2 | 2 | 2 | 2 | 3 | - | - | - | 1 | - | - | - | 2 | - | 2 |
| | IV | Textile Chemical Processing | 3 | 3 | 2 | 2 | - | - | - | - | 3 | - | - | 2 | 2 | 1 | 2 |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | IV | Computer Aided Fashion Designing Laboratory | 1 | 1 | 1 | 1 | 3 | - | - | - | 2 | 2 | 2 | 3 | 3 | 2 | 3 |
| | IV | Basics of Pattern Engineering and Garment Construction Laboratory | 3 | 2 | 3 | 2 | 2 | - | - | - | 2 | - | 2 | 3 | 3 | 3 | 3 |
| | IV | Textile Chemical Processing Lab | 2 | 1 | 1 | 2 | 3 | - | - | - | 3 | - | - | - | 2 | 1 | 1 |
| | V | Garment Construction | 1 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | - | 3 | 3 | 3 | 3 |
| | V | Apparel Production Planning and Process Control | 1 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | - | 3 | 3 | 3 | 3 |
| | V | Garment Construction Laboratory – I | 3 | 2 | 3 | 2 | 2 | - | - | - | 2 | - | 2 | 3 | 3 | 3 | 3 |
| | V | Computer Aided Garment Designing Laboratory | 3 | 2 | - | 2 | 3 | - | - | - | 2 | 1 | 1 | 3 | 2 | 2 | 3 |
| | VI | Apparel Marketing and Merchandising | 3 | 2 | 2 | 2 | 1 | 2 | - | - | - | - | - | - | 2 | 3 | - |
| | VI | Industrial Engineering in Garment Manufacturing | 2.2 | 2.4 | 2.8 | 2.8 | 2.8 | 1.6 | 1.6 | 1.8 | 1.6 | 1 | - | - | 3 | 2 | 2.8 |
| | VI | Garment Construction Laboratory – II | 3 | 2 | 3 | 2 | 2 | - | - | - | 2 | - | 2 | 3 | 3 | 3 | 3 |
| | VI | Design Collection / Portfolio | 1 | 3 | 1 | 3 | 2 | - | - | - | 2 | 2 | 2 | 3 | 3 | 3 | 3 |
| | VII | Fundamentals of economics and apparel costing | | | | | | | | | | | | | | | |
| | VII | Apparel Product Engineering Laboratory | | | | | | | | | | | | | | | |
| | | **PROFESSIONAL ELECTIVES [PEC]** | | | | | | | | | | | | | | | |
| | V | Fashion forecasting | 1 | 2 | 3 | 3 | 3 | - | 3 | 1 | 2 | - | 1 | 2 | 3 | 3 | 3 |
| | V | Apparel Product Development | 2 | 3 | 1 | - | 2 | 1 | 3 | - | - | - | 2 | - | 2 | - | 3 |
| | V | Automations in Apparel manufacture | 1 | 1.8 | 2.8 | 2.8 | 3 | 1 | - | 1 | 1.4 | - | 2 | - | 1.2 | 3 | 3 |
| | V | Operation research in Apparel Industry | 3 | 2 | 2 | 3 | 3 | - | - | - | - | 1 | 2 | 1 | 3 | 3 | 2 |
| | V | Technology of non-wovens | 1 | 1.2 | 1.4 | 0.2 | 1.2 | 0.6 | 1 | 0.2 | 0.8 | 0.4 | 0.8 | 1.2 | 0.6 | 0.8 | 0.8 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | V | Visual merchandising | 2 | 1 | 2 | 2 | - | - | - | - | - | 2 | - | - | 2 | - | - |
| | V | Clothing Fit and comfort | | | | | | | | | | | | | | | |
| | V | Lean manufacturing | 1 | 1.8 | 2.4 | 3 | 3 | - | - | 2.8 | 2 | 2 | 1 | - | 3 | 2 | 3 |
| | V | Enterprise Resource Planning in Apparel industry | 3 | 2 | 2 | 3 | 3 | - | - | - | - | 1 | 2 | 1 | 3 | 3 | 2 |
| | V | Protective Garments | 1.4 | 1.4 | 1.2 | 0.8 | 0.6 | 0.4 | 0.8 | 0.6 | 0.6 | 0.6 | 0.6 | 1.4 | 0.8 | 1 | 0.8 |
| | V | Textile Heritage | | | | | | | | | | | | | | | |
| | V | Apparel trims, accessories and Embellishments | | | | | | | | | | | | | | | |
| | V | Supply chain management for Apparel Industry | - | - | - | - | 1.8 | 2.8 | 3 | 2.4 | 2 | 2.6 | 1 | 1 | 1 | 3 | 3 |
| | V | International Textile and apparel Business management | 2 | 1 | 1 | 2 | 1 | - | - | - | - | 1 | - | 1 | 2 | 1 | - |
| | V | Intimate apparels | 1.4 | 1.8 | 2 | 1 | 0.8 | 0.8 | 1.2 | 1.2 | 0.6 | 0.6 | 0.8 | 1.4 | 0.8 | 1.4 | 1.2 |
| | VI | Apparel Retail Management | 2 | 2 | 3 | 2 | - | - | - | - | - | - | 2 | - | 2 | 3 | - |
| | VI | Garment finishing and care | | | | | | | | | | | | | | | |
| | VI | Social compliances and quality assurance in apparel industry | - | - | - | - | - | 3 | 2.6 | 3 | 1 | 2 | 2 | 3 | 1 | 3 | 2.8 |
| | VI | Entrepreneurship in apparel manufacture | 2 | 1.6 | 2 | 2.2 | 1.2 | 1.3 | 1.5 | 2.2 | 2.3 | - | - | - | 2 | 3 | 2 |
| | VI | Smart Textiles and Garments | 1.6 | 1.2 | 1.2 | 0.8 | 1 | 0.8 | 1.2 | 1 | 0.8 | 0.6 | 0.8 | 1.2 | 0.8 | 0.6 | 0.8 |
| | VI | Apparel Brand management | 1 | 2 | 3 | 1 | 2 | - | - | - | - | - | - | - | - | 2 | - |
| | VI | Home Furnishing | | | | | | | | | | | | | | | |
| | VI | Advanced Technologies for Apparel Industry | | | | | | | | | | | | | | | |
| | VI | Sustainable apparel Business Management | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | - | - | - | - | 2 | 3 | 2 |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | VI | Sports Textiles and Garments | 1.6 | 1.4 | 1.6 | 1.8 | 1.2 | 1.2 | 1.2 | 1 | 1.4 | 0.8 | 1.4 | 1.4 | 1.2 | 1.2 | 1.4 |
| | VI | Digital Marketing and E-Business | 2 | 2 | 2 | 1 | 3 | 1 | - | - | - | - | - | - | 2 | 1 | - |
| | VI | Knit Product Development | | | | | | | | | | | | | | | |
| | VI | Apparel Production Management | | | | | | | | | | | | | | | |
| | VI | Human Resource Management | 2 | 1.3 | 1.2 | 1.7 | 1.8 | 1.4 | 1.3 | 2 | 1.2 | 1.2 | 1 | 1.7 | 2 | 1.6 | 1.5 |
| | VI | Medical Textiles and Garments | 1 | 1 | 1.4 | 1.4 | 0.8 | 1.4 | 1 | 1 | 1 | 0.8 | 1 | 1 | 1 | 1.2 | 1 |
| | | **EMPLOYABILITY ENHANCEMENT COURSES (EEC)** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **1** | **2** | **3** |
| | V | Life Skills and Soft Skills | | | | | | | | | | | | | | | |
| | V | Industrial training/internship** | 3 | 3 | 2 | 2.6 | 2.8 | 2 | 2 | 2.1 | 2.1 | 3 | 2.4 | 2.6 | 2.6 | 2.8 | 2.4 |
| | VII | Industrial training/ internship* | 3 | 3 | 2 | 2.6 | 2.8 | 2 | 2 | 2.1 | 2.1 | 3 | 2.4 | 2.6 | 2.6 | 2.8 | 2.4 |
| | VIII | Industrial Training*/Project Work | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 3 | 2 | 3 |
| | | | | | | | | | | | | | | | | | |

**ANNA UNIVERSITY, CHENNAI**
**NON-AUTONOMOUS COLLEGES AFFILIATED COLLEGES**
**REGULATIONS 2021**
**B. TECH. FASHION TECHNOLOGY**
**CHOICE BASED CREDIT SYSTEM**
**CURRICULUM FOR SEMESTERS I TO VIII AND SYLLABI FOR SEMESTERS III AND IV**
**SEMESTER I**

| S. No. | COURSE CODE | COURSE TITLE | CATE-GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| 1. | IP3151 | Induction Programme | - | - | - | - | - | 0 |
| **THEORY** | | | | | | | | |
| 2. | HS3151 | Professional English - I | HSMC | 3 | 0 | 0 | 3 | 3 |
| 3. | MA3151 | Matrices and Calculus | BSC | 3 | 1 | 0 | 4 | 4 |
| 4. | PH3151 | Engineering Physics | BSC | 3 | 0 | 0 | 3 | 3 |
| 5. | CY3151 | Engineering Chemistry | BSC | 3 | 0 | 0 | 3 | 3 |
| 6. | GE3151 | Problem Solving and Python Programming | ESC | 3 | 0 | 0 | 3 | 3 |
| 7. | GE3172 | அறிவியல் தமிழ் / Scientific Thoughts in Tamil | HSMC | 1 | 0 | 0 | 1 | 1 |
| **PRACTICALS** | | | | | | | | |
| 8. | GE3171 | Problem Solving and Python Programming Laboratory | ESC | 0 | 0 | 4 | 4 | 2 |
| 9. | BS3171 | Physics and Chemistry Laboratory | BSC | 0 | 0 | 4 | 4 | 2 |
| 10. | GE3172 | English Laboratory $^{\$}$ | EEC | 0 | 0 | 2 | 2 | 1 |
| | | | **TOTAL** | **16** | **1** | **10** | **27** | **22** |

**$ Skill Based Course**

**SEMESTER II**

| SI. NO. | COURSE CODE | COURSETITLE | CATE-GORY | PERIODS PERWEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| **THEORY** | | | | | | | | |
| 1. | HS3251 | Professional English - II | HSMC | 2 | 0 | 0 | 2 | 2 |
| 2. | MA3251 | Statistics and Numerical Methods | BSC | 3 | 1 | 0 | 4 | 4 |
| 3. | FT3201 | Fibre Science | PCC | 3 | 0 | 0 | 3 | 3 |
| 4. | BE3252 | Basic Electrical, Electronics and Instrumentation Engineering | ESC | 3 | 0 | 0 | 3 | 3 |
| 5. | GE3251 | Engineering Graphics | ESC | 2 | 0 | 4 | 6 | 4 |
| 6. | CY3252 | Chemistry for Textile Technologists | BSC | 3 | 0 | 0 | 3 | 3 |
| 7. | | NCC Credit Course Level 1# | - | 2 | 0 | 0 | 2 | 2 |
| 8. | GE3252 | **தமிழர் மரபு / Heritage of Tamils** | HSMC | 1 | 0 | 0 | 1 | 1 |
| **PRACTICALS** | | | | | | | | |
| 9. | GE3271 | Engineering Practices Laboratory | ESC | 0 | 0 | 4 | 4 | 2 |
| 10. | BE3272 | Basic Electrical, Electronics and Instrumentation Engineering Laboratory | ESC | 0 | 0 | 4 | 4 | 2 |
| 11. | GE3272 | Communication Laboratory / Foreign Language [$] | EEC | 0 | 0 | 4 | 4 | 2 |
| | | | **TOTAL** | **17** | **1** | **16** | **34** | **26** |

# 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**

**SEMESTER III**

| S. NO. | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| **THEORY** | | | | | | | | |
| 1. | MA3357 | Probability and Statistical Methods | BSC | 3 | 1 | 0 | 4 | 4 |
| 2. | FT3001 | Characteristics of Textile Fibres | PCC | 3 | 0 | 0 | 3 | 3 |
| 3. | FT3002 | Technology of Spinning processes | PCC | 2 | 0 | 0 | 2 | 2 |
| 4. | FT3003 | Fabric Manufacturing | PCC | 3 | 0 | 0 | 3 | 3 |
| 5. | FT3004 | Fabric Structures | PCC | 3 | 0 | 0 | 3 | 3 |
| 6. | FT3005 | Concepts and Evolution of Fashion and Design | PCC | 3 | 0 | 0 | 3 | 3 |
| **PRACTICALS** | | | | | | | | |
| 7. | FT3311 | Fabric Structure Laboratory | PCC | 0 | 0 | 3 | 3 | 1.5 |
| 8. | FT3312 | Fashion Illustration Laboratory | PCC | 0 | 0 | 3 | 3 | 1.5 |
| 9. | GE33361 | Professional Development[$] | EEC | 0 | 0 | 2 | 2 | 1 |
| | | | **TOTAL** | **17** | **1** | **8** | **26** | **22** |

**$ Skill Based Course**

**SEMESTER IV**

| S. NO. | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| **THEORY** | | | | | | | | |
| 1. | FT3401 | Apparel Production Machinery | PCC | 3 | 0 | 0 | 3 | 3 |
| 2. | FT3402 | Fabric and Garment Quality Evaluation | PCC | 3 | 0 | 2 | 5 | 4 |
| 3. | FT3403 | Fundamentals of Garment Manufacturing | PCC | 3 | 0 | 0 | 3 | 3 |
| 4. | FT3404 | Pattern Engineering | PCC | 3 | 0 | 0 | 3 | 3 |
| 5. | FT3405 | Textile Chemical Processing | PCC | 3 | 0 | 0 | 3 | 3 |
| 6. | GE3451 | Environmental Sciences and Sustainability | BSC | 2 | 0 | 0 | 2 | 2 |
| 7. | | NCC Credit Course Level 2* | | 3 | 0 | 0 | 3 | 3 # |
| **PRACTICALS** | | | | | | | | |
| 8. | FT3411 | Computer Aided Fashion Designing Laboratory | PCC | 0 | 0 | 2 | 2 | 1 |
| 9. | FT3412 | Basics of-Pattern Engineering and Garment Construction Laboratory | PCC | 0 | 0 | 3 | 3 | 1.5 |
| 10. | FT3413 | Textile Chemical Processing Lab | PCC | 0 | 0 | 3 | 3 | 1.5 |
| 11. | FT3513 | Industrial training/internship I* | EEC | 0 | 0 | 0 | 0 | 0 |
| | | | **TOTAL** | **17** | **0** | **10** | **27** | **22** |

# 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**

| S. NO. | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| **THEORY** | | | | | | | | |
| 1. | FT3501 | Garment Construction | PCC | 3 | 0 | 0 | 3 | 3 |
| 2. | FT3591 | Apparel Production Planning and Process Control | PCC | 3 | 0 | 0 | 3 | 3 |
| 3. | | Professional Elective I | PEC | 3 | 0 | 0 | 3 | 3 |
| 4. | | Professional Elective II | PEC | 3 | 0 | 0 | 3 | 3 |
| 5. | | Professional Elective III | PEC | 3 | 0 | 0 | 3 | 3 |
| 6. | | Mandatory Course-I[&] | MC | 3 | 0 | 0 | 3 | 0 |
| **PRACTICALS** | | | | | | | | |
| 7. | FT 3511 | Garment Construction | PCC | 0 | 0 | 3 | 3 | 1.5 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Laboratory – I | | | | | | |
| 8. | FT3512 | Computer Aided Garment Designing Laboratory | PCC | 0 | 0 | 3 | 3 | 1.5 |
| 9. | FT3513 | Industrial training / internship I** | EEC | 0 | 0 | 0 | 0 | 2 |
| | | | **TOTAL** | **15** | **0** | **6** | **21** | **20** |

[&] **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**

| S. NO. | COURSE CODE | COURSE TITLE | CATEGORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| **THEORY** | | | | | | | | |
| 1. | FT3691 | Apparel Marketing and Merchandising | PCC | 3 | 0 | 0 | 3 | 3 |
| 2. | CFT331 | Industrial Engineering in Garment Manufacturing | PCC | 3 | 0 | 0 | 3 | 3 |
| 3. | | Open Elective – I* | OEC | 3 | 0 | 0 | 3 | 3 |
| 4. | | Professional Elective IV | PEC | 3 | 0 | 0 | 3 | 3 |
| 5. | | Professional Elective V | PEC | 3 | 0 | 0 | 3 | 3 |
| 6. | | Professional Elective VI | PEC | 3 | 0 | 0 | 3 | 3 |
| 7. | | Mandatory Course-II[&] | MC | 3 | 0 | 0 | 3 | 0 |
| 8. | | NCC Credit Course Level 3** | | 3 | 0 | 0 | 3 | 3 # |
| **PRACTICALS** | | | | | | | | |
| 9. | FT3611 | Garment Construction Laboratory – II | PCC | 0 | 0 | 3 | 3 | 1.5 |
| 10. | FT3612 | Design Collection / Portfolio | PCC | 0 | 0 | 3 | 3 | 1.5 |
| 11. | FT3712 | Industrial training/ Internship II** | EEC | 0 | 0 | 0 | 0 | 0 |
| | | | **TOTAL** | **21** | **0** | **6** | **27** | **21** |

***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***

| S. NO. | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| **THEORY** | | | | | | | | |
| 1. | FT3701 | Fundamentals of economics and apparel costing | PCC | 3 | 0 | 0 | 3 | 3 |
| 2. | GE3751 | Human values and Ethics | HSMC | 2 | 0 | 0 | 2 | 2 |
| 3. | | Elective- Management # | HSMC | 3 | 0 | 0 | 3 | 3 |
| 4. | | Open Elective – II** | OEC | 3 | 0 | 0 | 3 | 3 |
| 5. | | Open Elective – III*** | OEC | 3 | 0 | 0 | 3 | 3 |
| 6. | | Open Elective – IV*** | OEC | 3 | 0 | 0 | 3 | 3 |
| **PRACTICALS** | | | | | | | | |
| 7. | FT3711 | Apparel Product Engineering Laboratory | PCC | 0 | 0 | 4 | 4 | 2 |
| 8. | FT3712 | Industrial training/ Internship II## | EEC | 0 | 0 | 0 | 0 | 2 |
| | | | **TOTAL** | **17** | **0** | **4** | **21** | **21** |

***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***

| S. NO. | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| **PRACTICALS** | | | | | | | | |
| 1. | FT3811 | Internship#/ Project Work | EEC | 0 | 0 | 20 | 20 | 10 |
| | | | **TOTAL** | 0 | 0 | 20 | 20 | **10** |

***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 : 164**

## ELECTIVE – MANAGEMENT COURSES

| SL. NO. | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PERWEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| 1. | GE3751 | Principles of Management | HSMC | 3 | 0 | 0 | 3 | 3 |
| 2. | GE3752 | Total Quality Management | HSMC | 3 | 0 | 0 | 3 | 3 |
| 3. | GE3753 | Engineering Economics and Financial Accounting | HSMC | 3 | 0 | 0 | 3 | 3 |
| 4. | GE3754 | Human Resource Management | HSMC | 3 | 0 | 0 | 3 | 3 |
| 5. | GE3755 | Knowledge Management | HSMC | 3 | 0 | 0 | 3 | 3 |
| 6. | GE3792 | Industrial Management | HSMC | 3 | 0 | 0 | 3 | 3 |

## MANDATORY COURSES I

| SL. NO. | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| 1. | MX3081 | Introduction to Women and Gender Studies | MC | 3 | 0 | 0 | 3 | 0 |
| 2. | MX3082 | Elements of Literature | MC | 3 | 0 | 0 | 3 | 0 |
| 3. | MX3083 | Film Appreciation | MC | 3 | 0 | 0 | 3 | 0 |
| 4. | MX3084 | Disaster Management | MC | 3 | 0 | 0 | 3 | 0 |

## MANDATORY COURSES II

| SL. NO. | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| 1. | MX3085 | Well Being with traditional practices (Yoga, Ayurveda and Siddha) | MC | 3 | 0 | 0 | 3 | 0 |
| 2. | MX3086 | History of Science and Technology in India | MC | 3 | 0 | 0 | 3 | 0 |
| 3. | MX3087 | Political and Economic Thought for a Humane Society | MC | 3 | 0 | 0 | 3 | 0 |
| 4. | MX3088 | State, Nation Building and Politics in India | MC | 3 | 0 | 0 | 3 | 0 |
| 5. | MX3089 | Industrial Safety | MC | 3 | 0 | 0 | 3 | 0 |

## PROFESSIONAL ELECTIVE COURSES : VERTICALS

| Vertical I Apparel Marketing | Vertical II Apparel Product Development | Vertical III Garment Manufacturing | Vertical IV Management | Vertical V Specialty Apparel |
|---|---|---|---|---|
| Fashion forecasting | Apparel Product Development | Automations in Apparel manufacture | Operation research in Apparel Industry | Technology of non-wovens |
| Visual merchandising | Clothing Fit and comfort | Lean manufacturing | Enterprise Resource Planning in Apparel industry | Protective Garments |
| Textile Heritage | Apparel trims, accessories and Embellishments | Supply chain management for Apparel Industry | International Textile and apparel Business management | Intimate apparels |
| Apparel Retail Management | Garment finishing and care | Social compliances and quality assurance in apparel industry | Entrepreneurship in apparel manufacture | Smart Textiles and Garments |
| Apparel Brand management | Home Furnishing | Advanced Technologies for Apparel Industry | Sustainable apparel Business Management | Sports Textiles and Garments |
| Digital Marketing and E-Business | Knit Product Development | Computer Applications In Apparel Manufacturing | Human Resource Management | Medical Textiles and Garments |

**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 refer to Regulations 2021 Clause 4.10.

## PROFESSIONAL ELECTIVE COURSES : VERTICALS

### VERTICAL I: APPAREL MARKETING APPAREL MARKETING

| SL. NO. | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| 1. | FT3001 | Fashion forecasting | PEC | 3 | 0 | 0 | 3 | 3 |
| 2. | FT3002 | Visual merchandising | PEC | 3 | 0 | 0 | 3 | 3 |
| 3. | FT3003 | Textile Heritage | PEC | 3 | 0 | 0 | 3 | 3 |
| 4. | FT3004 | Apparel Retail Management | PEC | 3 | 0 | 0 | 3 | 3 |
| 5. | FT3005 | Apparel Brand management | PEC | 3 | 0 | 0 | 3 | 3 |
| 6. | FT3006 | Digital Marketing and E-Business | PEC | 3 | 0 | 0 | 3 | 3 |

### VERTICAL II: APPAREL PRODUCT DEVELOPMENT

| SL. NO. | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| 1. | FT3007 | Apparel Product Development | PEC | 3 | 0 | 0 | 3 | 3 |
| 2. | FT3008 | Clothing Fit and comfort | PEC | 3 | 0 | 0 | 3 | 3 |
| 3. | FT3009 | Apparel trims, accessories and Embellishments | PEC | 3 | 0 | 0 | 3 | 3 |
| 4. | FT3010 | Garment finishing and care | PEC | 3 | 0 | 0 | 3 | 3 |
| 5. | FT3011 | Home Furnishing | PEC | 3 | 0 | 0 | 3 | 3 |
| 6. | FT3012 | Knit Product Development | PEC | 3 | 0 | 0 | 3 | 3 |

**VERTICAL III : GARMENT MANUFACTURING**

| SL. NO. | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| 1. | FT3013 | Automations in Apparel manufacture | PEC | 3 | 0 | 0 | 3 | 3 |
| 2. | FT3014 | Lean manufacturing | PEC | 3 | 0 | 0 | 3 | 3 |
| 3. | FT3015 | Supply chain management for Apparel Industry | PEC | 3 | 0 | 0 | 3 | 3 |
| 4. | FT3016 | Social compliances and quality assurance in apparel industry | PEC | 3 | 0 | 0 | 3 | 3 |
| 5. | FT3017 | Advanced Technologies for Apparel Industry | PEC | 3 | 0 | 0 | 3 | 3 |
| 6. | FT3018 | Apparel Production Management | PEC | 3 | 0 | 0 | 3 | 3 |

**VERTICAL IV : MANAGEMENT**

| SL. NO. | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| 1. | FT3019 | Operation research in Apparel Industry | PEC | 3 | 0 | 0 | 3 | 3 |
| 2. | FT3020 | Enterprise Resource Planning in Apparel industry | PEC | 3 | 0 | 0 | 3 | 3 |
| 3. | FT3021 | International Textile and apparel Business management | PEC | 3 | 0 | 0 | 3 | 3 |
| 4. | FT3022 | Entrepreneurship in apparel manufacture | PEC | 3 | 0 | 0 | 3 | 3 |
| 5. | FT3023 | Sustainable apparel Business Management | PEC | 3 | 0 | 0 | 3 | 3 |
| 6. | FT3024 | Human Resource Management | PEC | 3 | 0 | 0 | 3 | 3 |

**VERTICAL V : SPECIALTY APPAREL**

| SL. NO. | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| 1. | TT3691 | Technology of non-wovens | PEC | 3 | 0 | 0 | 3 | 3 |
| 2. | FT3025 | Protective Garments | PEC | 3 | 0 | 0 | 3 | 3 |
| 3. | FT3026 | Intimate apparels | PEC | 3 | 0 | 0 | 3 | 3 |
| 4. | FT3027 | Smart Textiles and Garments | PEC | 3 | 0 | 0 | 3 | 3 |
| 5. | FT3028 | Sports Textiles and Garments | PEC | 3 | 0 | 0 | 3 | 3 |
| 6. | FT3029 | Medical Textiles and Garments | PEC | 3 | 0 | 0 | 3 | 3 |

## OPEN ELECTIVES

**(**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

| SL. NO. | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| 1. | OCS351 | Artificial Intelligence and Machine Learning Fundamentals | OEC | 2 | 0 | 2 | 4 | 3 |
| 2. | OCS352 | IoT Concepts and Applications | OEC | 2 | 0 | 2 | 4 | 3 |
| 3. | OCS353 | Data Science Fundamentals | OEC | 2 | 0 | 2 | 4 | 3 |
| 4. | OCS354 | Augmented and Virtual Reality | OEC | 2 | 0 | 2 | 4 | 3 |

### OPEN ELECTIVES – III

| SL. NO. | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| 1. | OHS351 | English for Competitive Examinations | OEC | 3 | 0 | 0 | 3 | 3 |
| 2. | OCE353 | Lean Concepts, Tools And Practices | OEC | 3 | 0 | 0 | 3 | 3 |
| 3. | OMG352 | NGOs and Sustainable Development | OEC | 3 | 0 | 0 | 3 | 3 |
| 4. | OMG353 | Democracy and Good Governance | OEC | 3 | 0 | 0 | 3 | 3 |
| 5. | OME353 | Renewable Energy Technologies | OEC | 3 | 0 | 0 | 3 | 3 |
| 6. | OME354 | Applied Design Thinking | OEC | 2 | 0 | 2 | 4 | 3 |
| 7. | OMF351 | Reverse Engineering | OEC | 3 | 0 | 0 | 3 | 3 |
| 8. | OMF353 | Sustainable Manufacturing | OEC | 3 | 0 | 0 | 3 | 3 |
| 9. | OAU351 | Electric and Hybrid Vehicle | OEC | 3 | 0 | 0 | 3 | 3 |
| 10. | OAS352 | Space Engineering | OEC | 3 | 0 | 0 | 3 | 3 |
| 11. | OIM351 | Industrial Management | OEC | 3 | 0 | 0 | 3 | 3 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 12. | OIE354 | Quality Engineering | OEC | 3 | 0 | 0 | 3 | 3 |
| 13. | OSF351 | Fire Safety Engineering | OEC | 3 | 0 | 0 | 3 | 3 |
| 14. | OML351 | Introduction to non-destructive testing | OEC | 3 | 0 | 0 | 3 | 3 |
| 15. | OMR351 | Mechatronics | OEC | 3 | 0 | 0 | 3 | 3 |
| 16. | ORA351 | Foundation of Robotics | OEC | 3 | 0 | 0 | 3 | 3 |
| 17. | OAE352 | Fundamentals of Aeronautical engineering | OEC | 3 | 0 | 0 | 3 | 3 |
| 18. | OGI351 | Remote Sensing Concepts | OEC | 3 | 0 | 0 | 3 | 3 |
| 19. | OAI351 | Urban Agriculture | OEC | 3 | 0 | 0 | 3 | 3 |
| 20. | OEN351 | Drinking Water Supply and Treatment | OEC | 3 | 0 | 0 | 3 | 3 |
| 21. | OEE352 | Electric Vehicle technology | OEC | 3 | 0 | 0 | 3 | 3 |
| 22. | OEI353 | Introduction to PLC Programming | OEC | 3 | 0 | 0 | 3 | 3 |
| 23. | OBT352 | Biomedical Instrumentation | OEC | 3 | 0 | 0 | 3 | 3 |
| 24. | OFD352 | Traditional Indian Foods | OEC | 3 | 0 | 0 | 3 | 3 |
| 25. | OFD353 | Introduction to food processing | OEC | 3 | 0 | 0 | 3 | 3 |
| 26. | OPY352 | IPR for Pharma Industry | OEC | 3 | 0 | 0 | 3 | 3 |
| 27. | OCH351 | Nano Technology | OEC | 3 | 0 | 0 | 3 | 3 |
| 28. | OCH352 | Functional Materials | OEC | 3 | 0 | 0 | 3 | 3 |
| 29. | OPE351 | Introduction to Petroleum Refining and Petrochemicals | OEC | 3 | 0 | 0 | 3 | 3 |
| 30. | OPE352 | Energy Conservation and Management | OEC | 3 | 0 | 0 | 3 | 3 |
| 31. | OPT351 | Basics of Plastics Processing | OEC | 3 | 0 | 0 | 3 | 3 |
| 32. | OEC351 | Signals and Systems | OEC | 3 | 0 | 0 | 3 | 3 |
| 33. | OEC352 | Fundamentals of Electronic Devices and Circuits | OEC | 3 | 0 | 0 | 3 | 3 |
| 34. | OBM351 | Foundation Skills in integrated product Development | OEC | 3 | 0 | 0 | 3 | 3 |
| 35. | OBM352 | Assistive Technology | OEC | 3 | 0 | 0 | 3 | 3 |
| 36. | OMA352 | Operations Research | OEC | 3 | 0 | 0 | 3 | 3 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 37. | OMA353 | Algebra and Number Theory | OEC | 3 | 0 | 0 | 3 | 3 |
| 38. | OMA354 | Linear Algebra | OEC | 3 | 0 | 0 | 3 | 3 |

**OPEN ELECTIVES – IV**

| SL. NO. | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| 1. | OHS352 | Project Report Writing | OEC | 3 | 0 | 0 | 3 | 3 |
| 2. | OCE354 | Basics of Integrated Water Resources Management | OEC | 3 | 0 | 0 | 3 | 3 |
| 3. | OMA355 | Advanced Numerical Methods | OEC | 3 | 0 | 0 | 3 | 3 |
| 4. | OMA356 | Random Processes | OEC | 3 | 0 | 0 | 3 | 3 |
| 5. | OMA357 | Queuing and Reliability Modelling | OEC | 3 | 0 | 0 | 3 | 3 |
| 6. | OMG354 | Production and Operations Management for Entrepreneurs | OEC | 3 | 0 | 0 | 3 | 3 |
| 7. | OMG355 | Multivariate Data Analysis | OEC | 3 | 0 | 0 | 3 | 3 |
| 8. | OME352 | Additive Manufacturing | OEC | 3 | 0 | 0 | 3 | 3 |
| 9. | OME353 | New Product Development | OEC | 3 | 0 | 0 | 3 | 3 |
| 10. | OME355 | Industrial Design & Rapid Prototyping Techniques | OEC | 2 | 0 | 2 | 4 | 3 |
| 11. | OMF352 | Micro and Precision Engineering | OEC | 3 | 0 | 0 | 3 | 3 |
| 12. | OMF354 | Cost Management of Engineering Projects | OEC | 3 | 0 | 0 | 3 | 3 |
| 13. | OAU352 | Batteries and Management system | OEC | 3 | 0 | 0 | 3 | 3 |
| 14. | OAU353 | Sensors and Actuators | OEC | 3 | 0 | 0 | 3 | 3 |
| 15. | OAS353 | Space Vehicles | OEC | 3 | 0 | 0 | 3 | 3 |
| 16. | OIM352 | Management Science | OEC | 3 | 0 | 0 | 3 | 3 |
| 17. | OIM353 | Production Planning and Control | OEC | 3 | 0 | 0 | 3 | 3 |
| 18. | OIE353 | Operations | OEC | 3 | 0 | 0 | 3 | 3 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Management | | | | | | |
| 19. | OSF352 | Industrial Hygiene | OEC | 3 | 0 | 0 | 3 | 3 |
| 20. | OSF353 | Chemical Process Safety | OEC | 3 | 0 | 0 | 3 | 3 |
| 21. | OML352 | Electrical, Electronic and Magnetic materials | OEC | 3 | 0 | 0 | 3 | 3 |
| 22. | OML353 | Nanomaterials and applications | OEC | 3 | 0 | 0 | 3 | 3 |
| 23. | OMR352 | Hydraulics and Pneumatics | OEC | 3 | 0 | 0 | 3 | 3 |
| 24. | OMR353 | Sensors | OEC | 3 | 0 | 0 | 3 | 3 |
| 25. | ORA352 | Foundation of Automation | OEC | 3 | 0 | 0 | 3 | 3 |
| 26. | ORA353 | Concepts in Mobile Robotics | OEC | 3 | 0 | 0 | 3 | 3 |
| 27. | OMV351 | Marine Propulsion | OEC | 3 | 0 | 0 | 3 | 3 |
| 28. | OMV352 | Marine Merchant Vehicles | OEC | 3 | 0 | 0 | 3 | 3 |
| 29. | OMV353 | Elements of Marine Engineering | OEC | 3 | 0 | 0 | 3 | 3 |
| 30. | OAE353 | Drone Technologies | OEC | 3 | 0 | 0 | 3 | 3 |
| 31. | OGI352 | Geographical Information System | OEC | 3 | 0 | 0 | 3 | 3 |
| 32. | OAI352 | Agriculture Entrepreneurship Development | OEC | 3 | 0 | 0 | 3 | 3 |
| 33. | OEN352 | Biodiversity Conservation | OEC | 3 | 0 | 0 | 3 | 3 |
| 34. | OEE353 | Introduction to control systems | OEC | 3 | 0 | 0 | 3 | 3 |
| 35. | OEI354 | Introduction to Industrial Automation Systems | OEC | 3 | 0 | 0 | 3 | 3 |
| 36. | OBT353 | Environment and Agriculture | OEC | 3 | 0 | 0 | 3 | 3 |
| 37. | OFD354 | Fundamentals of Food Engineering | OEC | 3 | 0 | 0 | 3 | 3 |
| 38. | OFD355 | Food safety and Quality Regulations | OEC | 3 | 0 | 0 | 3 | 3 |
| 39. | OPY353 | Nutraceuticals | OEC | 3 | 0 | 0 | 3 | 3 |
| 40. | OCH353 | Energy Technology | OEC | 3 | 0 | 0 | 3 | 3 |
| 41. | OCH354 | Surface Science | OEC | 3 | 0 | 0 | 3 | 3 |
| 42. | OPE353 | Industrial safety | OEC | 3 | 0 | 0 | 3 | 3 |
| 43. | OPE354 | Unit Operations in Petro Chemical Industries | OEC | 3 | 0 | 0 | 3 | 3 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 44. | OPT352 | Plastic Materials for Engineers | OEC | 3 | 0 | 0 | 3 | 3 |
| 45. | OPT353 | Properties and Testing of Plastics | OEC | 3 | 0 | 0 | 3 | 3 |
| 46. | OEC353 | VLSI Design | OEC | 3 | 0 | 0 | 3 | 3 |
| 47. | OEC354 | Industrial IoT and Industry 4.0 | OEC | 2 | 0 | 2 | 4 | 3 |
| 48. | OBM353 | Wearable devices | OEC | 3 | 0 | 0 | 3 | 3 |
| 49. | OBM354 | Medical Informatics | OEC | 3 | 0 | 0 | 3 | 3 |

**SUMMARY**

| Name of the Programme | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| S.No | Subject Area | Credits per Semester | | | | | | | | Total Credits |
| | | I | II | III | IV | V | VI | VII/VIII | VIII/VII | |
| 1 | HSMC | 4 | 3 | | | | | 5 | | 12 |
| 2 | BSC | 12 | 7 | 4 | 2 | | | | | 25 |
| 3 | ESC | 5 | 11 | | | | | | | 16 |
| 4 | PCC | | 3 | 17 | 20 | 9 | 9 | 5 | | 63 |
| 5 | PEC | | | | | 9 | 9 | | | 18 |
| 6 | OEC | | | | | | 3 | 9 | | 12 |
| 7 | EEC | 1 | 2 | 1 | | 2 | | 2 | 10 | 18 |
| 8 | Non-Credit /(Mandatory) | | | | | √ | √ | | | |
| Total | | 22 | 26 | 22 | 22 | 20 | 21 | 21 | 10 | 164 |

**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)

| **Vertical I Fintech and Block Chain** | **Vertical II Entrepreneurship** | **Vertical III Public Administration** | **Vertical IV Business Data Analytics** | **Vertical V Environment and Sustainability** |
|---|---|---|---|---|
| Financial Management | Foundations of Entrepreneruship | Principles of Public Administration | Statistics For Managemen t | Sustainable infrastructure Development |
| Fundamentals of Investment | Team Building & Leadership Management for Business | Constitution of India | Datamining For Business Intelligence | Sustainable Agriculture and Environmental Management |
| Banking, Financial Services and Insurance | Creativity & Innovation in Entrepreneurship | Public Personnel Administration | Human Resource Analytics | Sustainable Bio Materials |
| Introduction to Blockchain and its Applications | Principles of Marketing Management For Business | Administrative Theories | Marketing And Social Media Web Analytics | Materials for Energy Sustainability |
| Fintech Personal Finance and Payments | Human Resource Management for Entrepreneurs | Indian Administrative System | Operation And Supply Chain Analytics | Green Technology |
| Introduction to Fintech | Financing New Business Ventures | Public Policy Administration | Financial Analytics | Environmental Quality Monitoring and Analysis |
| - | - | - | - | Integrated Energy Planning for Sustainable Development |
| - | - | - | - | Energy Efficiency for Sustainable Development |

**(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**

| SL. NO. | COURSE CODE | COURSE TITLE | CATEGORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| 1. | CMG331 | Financial Management | PEC | 3 | 0 | 0 | 3 | 3 |
| 2. | CMG332 | Fundamentals of Investment | PEC | 3 | 0 | 0 | 3 | 3 |
| 3. | CMG333 | Banking, Financial Services and Insurance | PEC | 3 | 0 | 0 | 3 | 3 |
| 4. | CMG334 | Introduction to Blockchain and its Applications | PEC | 3 | 0 | 0 | 3 | 3 |
| 5. | CMG335 | Fintech Personal Finance and Payments | PEC | 3 | 0 | 0 | 3 | 3 |
| 6. | CMG336 | Introduction to Fintech | PEC | 3 | 0 | 0 | 3 | 3 |

**VERTICAL 2: ENTREPRENEURSHIP**

| SL. NO. | COURSE CODE | COURSE TITLE | CATEGORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| 1. | CMG337 | Foundations of Entrepreneruship | PEC | 3 | 0 | 0 | 3 | 3 |
| 2. | CMG338 | Team Building & Leadership Management for Business | PEC | 3 | 0 | 0 | 3 | 3 |
| 3. | CMG339 | Creativity & Innovation in Entrepreneurship | PEC | 3 | 0 | 0 | 3 | 3 |
| 4. | CMG340 | Principles of Marketing Management For Business | PEC | 3 | 0 | 0 | 3 | 3 |
| 5. | CMG341 | Human Resource Management for Entrepreneurs | PEC | 3 | 0 | 0 | 3 | 3 |
| 6. | CMG342 | Financing New Business Ventures | PEC | 3 | 0 | 0 | 3 | 3 |

**VERTICAL 3: PUBLIC ADMINISTRATION**

| SL. NO. | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| 1. | CMG343 | Principles of Public Administration | PEC | 3 | 0 | 0 | 3 | 3 |
| 2. | CMG344 | Constitution of India | PEC | 3 | 0 | 0 | 3 | 3 |
| 3. | CMG345 | Public Personnel Administration | PEC | 3 | 0 | 0 | 3 | 3 |
| 4. | CMG346 | Administrative Theories | PEC | 3 | 0 | 0 | 3 | 3 |
| 5. | CMG347 | Indian Administrative System | PEC | 3 | 0 | 0 | 3 | 3 |
| 6. | CMG348 | Public Policy Administration | PEC | 3 | 0 | 0 | 3 | 3 |

**VERTICAL 4: BUSINESS DATA ANALYTICS**

| SL. NO. | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| 1. | CMG349 | Statistics For Management | PEC | 3 | 0 | 0 | 3 | 3 |
| 2. | CMG350 | Datamining For Business Intelligence | PEC | 3 | 0 | 0 | 3 | 3 |
| 3. | CMG351 | Human Resource Analytics | PEC | 3 | 0 | 0 | 3 | 3 |
| 4. | CMG352 | Marketing And Social Media Web Analytics | PEC | 3 | 0 | 0 | 3 | 3 |
| 5. | CMG353 | Operation And Supply Chain Analytics | PEC | 3 | 0 | 0 | 3 | 3 |
| 6. | CMG354 | Financial Analytics | PEC | 3 | 0 | 0 | 3 | 3 |

**VERTICAL 5: ENVIRONMENT AND SUSTAINABILITY**

| SL. NO. | COURSE CODE | COURSE TITLE | CATE GORY | PERIODS PER WEEK | | | TOTAL CONTACT PERIODS | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | |
| 1. | CES331 | Sustainable infrastructure Development | PEC | 3 | 0 | 0 | 3 | 3 |
| 2. | CES332 | Sustainable Agriculture and Environmental Management | PEC | 3 | 0 | 0 | 3 | 3 |
| 3. | CES333 | Sustainable Bio Materials | PEC | 3 | 0 | 0 | 3 | 3 |
| 4. | CES334 | Materials for Energy Sustainability | PEC | 3 | 0 | 0 | 3 | 3 |
| 5. | CES335 | Green Technology | PEC | 3 | 0 | 0 | 3 | 3 |
| 6. | CES336 | Environmental Quality Monitoring and Analysis | PEC | 3 | 0 | 0 | 3 | 3 |
| 7. | CES337 | Integrated Energy Planning for Sustainable Development | PEC | 3 | 0 | 0 | 3 | 3 |
| 8. | CES338 | Energy Efficiency for Sustainable Development | PEC | 3 | 0 | 0 | 3 | 3 |

**MA3357 PROBABILITY AND STATISTICAL METHODS L T P C**
**3 1 0 4**

**COURSE OBJECTIVES:**

- 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**

Probability – axioms of probability – Conditional probability – Baye's theorem - Discrete and continuous random variables – Moments – Moment Generating functions – Binomial, Poisson, Geometric, Uniform , Exponential , Gamma and Normal distributions.

**UNIT – II: TWO DIMENSIONAL RANDOM VARIABLES 9 + 3**

Join distributions – Marginal distributions and conditional distributions –Moments - Covariance - Transforms of random variables – Central limit theorem.

**UNIT – III: DIFFERENTIAL EQUATIONS 9 + 3**

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

**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 – Lasperyre'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.

**TOTAL PERIODS: 60**

**COURSE 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

**TEXTBOOKS:**

1. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.
2. Milton. J. S. and Arnold. J.C., "Introduction to Probability and Statistics", Tata McGraw Hill, 4th Edition, 2007.
3. Kreyszig.E, "Advanced Engineering Mathematics", John Wiley and Sons, 10 th Edition, New Delhi, 2016.
4. Grewal.B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44 th Edition , 2018.
5. Richard I. Levin, David S. Rubin, Sanjay Rastogi Masood Husain Siddiqui, Statistics for Management, Pearson Education, 7th Edition, 2016.

**REFERENCES:**

1. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.
2. Papoulis, A. and Unnikrishnapillai, S., "Probability, Random Variables and Stochastic Processes", McGraw Hill Education India, 4th Edition, New Delhi, 2010.
3. Jain . R.K. and Iyengar. S.R.K., " Advanced Engineering Mathematics ", Narosa Publications, New Delhi, 5 th Edition, 2016.
4. Ramana. B.V., " Higher Engineering Mathematics ", McGraw Hill Education Pvt. Ltd, New Delhi, 2016.
5. Prem.S.Mann, "Introductory Statistics" 7th Edition, Wiley India, 2016.
6. Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, "An Introduction to Statistical Learning with Applications in R", Springer, 2016.
7. Aczel A.D. and Sounderpandian J., "Complete Business Statistics", 6th edition, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2012.

**FT3001 CHARACTERISTICS OF TEXTILE FIBRES L T P C**
**3 0 0 3**

**OBJECTIVES**

To enable the students to understand the

- Physical characteristics of textile fibres

**UNIT I STRUCTURE AND INVESTIGATION TECHNIQUES OF FIBRES 9**

Classification of fibres; study of morphological structures of fibers; Transmission and Scanning electron microscopes-principle; construction and working; X-ray diffraction techniques – estimation of crystallinity; Infrared radiation and dichroism techniques

**UNIT II MOISTURE ABSORPTION CHARACTERISTICS 9**

Theories of moisture sorption; moisture absorption behavior of natural and man-made fibres; influence of fibre structure, humidity and temperature on the moisture absorption; conditioning of fibres –mechanism of conditioning and factors influencing conditioning .moisture diffusion in fibres; heat of sorption – factors influencing heat of sorption - measurement of heat of sorption

**UNIT III TENSILE AND ELONGATION CHARACTERISTICS OF FIBRES 9**

Tensile characteristics –study of strength, elongation, work of rupture, initial modulus, work factor and yield point – determination of yield point. stress-strain relations of natural and manmade fibres - influence of fibre structure, humidity and temperature on tensile characteristics. time effects- study of creep phenomena.

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

Elastic recovery and its relation to stress and strain of fibres; mechanical conditioning of fibres and its influence on elastic recovery .load cycling and extension cycling-their effect on elastic recovery. introduction about torsional and flexural rigidity of fibers

**UNIT V OPTICAL, FRICTIONAL, AND THERMAL CHARACTERISTICS 9**

Reflexion and lustre-objective and subjective methods of measurement - refractive index and its measurement - friction – its measurement, comparison of fibres, directional friction in wool – friction. thermal transitions of fibres - thermal conductivity, thermal expansion and contraction, Tg, melting; static electricity in textile fibres

**TOTAL: 45 PERIODS**

**Course Outcomes**

| | |
|---|---|
| **CO1** | Investigate and identify fibers based on their morphological structure |
| **CO2** | Identify the factors influencing moisture and heat sorption behavior of fibres |
| **CO3** | Identify the factors influencing tensile and elongation behavior of fibres |
| **CO4** | Understand the elastic recovery behaviour of fibres |
| **CO5** | Understand and measure the optical, frictional, and thermal characteristics of fibres |

**TEXTBOOKS**

1.MortonW.E.,andHearleJ.W.S.,"PhysicalPropertiesofTextileFibres",TheTextileInstitute, Washington D.C., 2008, ISBN978-1-84569-220-95

2.HearleJ.W.S,LomasB.,andCookeW.D.,"AtlasofFibreFractureandDamagetoTextiles", The Textile Institute, 2nd Edition, 1998, ISBN:1855733196

**REFERENCES**

1. Meredith R., and Hearle J. W. S., "Physical Methods of Investigation of Textiles", Wiley Publication,New York, 1989, ISBN: B00JCV6ZWU ISBN-13:

2. MukhopadhyayS. K., "Advances in Fibre Science", The Textile Institute,1992, ISBN: 1870812379

3.MeredithR.,"MechanicalPropertiesofTextileFibres",NorthHolland,Amsterdam,1986,ISBN: 1114790699, ISBN-13:9781114790698

4. RaheelM. (ed.)., "Modern Textile Characterization Methods", Marcel Dekker, 1995, ISBN:0824794737

5. Mukhopadhyay. S. K., "The Structure and Properties of Typical Melt Spun Fibres", Textile Progress, Vol. 18, No. 4, Textile Institute, 1989, ISBN:1870812115

6. Hearle J.W.S., "Polymers and Their Properties: Fundamentals of Structures and Mechanics Vol1",EllisHorwood,England,1982,ISBN:047027302X|ISBN-13:9780470273029

7. Greaves. P. H., and Saville B.P., "Microscopy of Textile Fibres", Bios Scientific, U.K., 1995, ISBN:1872748244ISBN-13:9781872748245

8. Seville. B. P., "Physical Testing of Textiles", Woodhead Publishing, 1999,ISBN: 1855733676 | ISBN-13:9781855733671

9. Hearle J. W. S., and Peters. R. H., “Fibre structure”, Elsevier Ltd, 1963, ISBN: 1483212211 | ISBN-13:9781483212210

| Course Outcomes | Statement | Program Outcome | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| CO1 | Investigate and identify fibers based on their morphological structure | 3 | 3 | 3 | 3 | 2 | - | - | - | - | - | - | 2 | 3 | 1 | 2 |
| CO2 | Identify the factors influencing moisture and heat sorption behavior of fibres | 3 | 3 | 3 | 3 | 2 | - | - | - | - | - | - | 2 | 3 | 1 | 2 |
| CO3 | Identify the factors influencing tensile and elongation behavior of fibres | 3 | 3 | 3 | 3 | 2 | - | - | - | - | - | - | 2 | 3 | 1 | 2 |
| CO4 | Understand the elastic recovery behaviour of fibres | 3 | 3 | 3 | 3 | 2 | - | - | - | - | - | - | 2 | 3 | 1 | 2 |
| CO5 | Understand and measure the optical, frictional, and thermal characteristics of fibres | 3 | 3 | 3 | 3 | 2 | - | - | - | - | - | - | 2 | 3 | 1 | 2 |
| Overall CO | | 3 | 3 | 3 | 3 | 2 | - | - | - | - | - | - | 2 | 3 | 1 | 2 |

**FT3002 TECHNOLOGY OF SPINNING PROCESSES L T P C**
**2 0 0 2**

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

**UNIT I OUTLINE & PASSAGE FLOW OF SHORT STAPLE SPINNING 10**
Linear density systems for textile materials; – objectives, types, working principle of Ginning , blow room , **Carding ,drawing machine** ,**roving machine, Ring spinning**

**UNIT II OUTLINE & PASSAGE FLOW OF LONG STAPLE SPINNING 4**
Comber preparation – objectives, principles of sliver lap ribbon lap and super lap formers; comber- principle of combing, sequence of combing operation.

**UNIT III OUTLINE & PASSAGE FLOW OF OPEN END SPINNING 6**
Principles of yarn formation and material flow – rotor, friction, air-jet and air vortex spinning machines ; core, wrap spinning system, comparison of yarn properties

**UNIT IV OUTLINE & PASSAGE FLOW OF SEWING THREAD AND SPECIALITY YARNS: 5**
**Sewing Thread Manufacture: Fibres used and their characteristics. Essential quality** requirements of sewing threads, Sequence of manufacturing process for sewing threads for cotton, polyester and polyester / cotton blends. Speciality Yarns: Fancy yarns, textured yarns and Melange yarns-Types and classifications, application . Core spun yarns.

**UNIT V OUTLINE & PASSAGE FLOW OF SPECIALITY SPINNING 5**
Melt spinning, Dry spinning, Sol gel spinning, Hollow spinning, specialized non-circular cross section fibres, spinning for - nonwovens, Optical fibres, thermotropic liquid-crystal polymers, Electro spinning.

**TOTAL: 30 PERIODS**

**OUTCOMES:**
Upon completion of this course, the student shall understand
Process sequence for producing different types of yarns
Principle of machines used for production of yarn
Principle of Technology used to produce different types of yarns.

**TEXT BOOKS:**

1. Lawrence C.A. Advances in Yarn Spinning Technology, Woodhead publishing, 2010
2. Klein W., "The Technology of Short-staple Spinning", The Textile Institute, Manchester, 1998.
3. Oxtoby E., “Spun Yarn Technology “, Butterworth, London, 1987, ISBN: 0408014644/ISBN- 13: 9780408014649.
4. Bin Ding, Xianfeng Wang and Jianyong Yu, Electrospinning: Nanofabrication and Applications, Woodhead publishing, 2019


**REFERENCES:**

1. Klein W., “The Rieter Manual of Spinning, Vol.1”, Rieter Machine Works Ltd., Winterthur, 2014, ISBN 10 3-9523173-1-4 / ISBN 13 978-3-9523173-1-0.
2. Klein W., “The Rieter Manual of Spinning, Vol.2”, Rieter Machine Works Ltd., Winterthur, 2014, ISBN 10 3-9523173-2-2 / ISBN 13 978-3-9523173-2-7.
3. Klein W., “The Rieter Manual of Spinning, Vol.3”, Rieter Machine Works Ltd., Winterthur, 2014, ISBN 10 3-9523173-3-0 / ISBN 13 978-3-9523173-3-4
4. Klein W., and Stalder H., “The Rieter Manual of Spinning", Vol.4, Rieter Machine Works Ltd., Winterthur, 2014, ISBN: 10 3-9523173-4-9 / ISBN: 13 978-3-9523173.
5. Ernst H., “The Rieter Manual of Spinning", Vol.5, Rieter Machine Works Ltd., Winterthur, 2014, ISBN: 10 3-9523173-5-7 / ISBN: 13 978-3-9523173-5-8
6. Stalder H., “The Rieter Manual of Spinning", Vol.6, Rieter Machine Works Ltd., Winterthur, 2014, ISBN: 10 3-9523173-6-5 / ISBN: 13 978-3-9523173-6-5.
7. Thomas Weide, “The Rieter Manual of Spinning", Vol.7, Rieter Machine Works Ltd., Winterthur, 2014, ISBN: 10 3-9523173-7-3 / ISBN: 13 978-3-9523173-7-2.
8. Lord P. R., “Yarn Production: Science, Technology and Economics”, The Textile Institute, Manchester, 2003, ISBN: 1855736969 | ISBN-13: 9781855736962
9. Doraiswamy I., Chellamani P., and Pavendhan A., “Cotton Ginning, Textile Progress”, The Textile Institute, Manchester, 1993, ISBN: 1870812484 / ISBN: 978-1870812481.
10. Salhotra K. R., and Ishtiaque S. M., “Rotor Spinning; its Advantages”, Limitations and Prospects in India, ATIRA, Ahmedabad, 1995
11. Trommer G., “Rotor Spinning”, Meliand Textile benchte GmbH, Rohrbacher, 1995, ISBN: 3871505099 | ISBN-13: 9783871505096
12. Lawerence C. A., and Chen K. Z., “Rotor Spinning”, Textile Progress, The Textile Institute, Manchester, 1984, ISBN: 0900739681 / ISBN: 978-0900739682

**Course Articulation Matrix:**

| Course Outcomes | Statement | Program Outcome | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
| CO1 | Infer the short staple spinning process and machineries | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 3 | 1 | 1 | 3 |
| CO2 | Infer the long staple spinning process and machineries | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 3 | 1 | 1 | 3 |
| CO3 | Outline the process of open-end spinning. | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 3 | 1 | 1 | 3 |
| CO4 | Apply the spinning concepts in fancy yarns and product diversifications. | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 3 | 1 | 1 | 3 |
| CO5 | Outline the process of speciality spinning | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 3 | 1 | 1 | 3 |
| **Overall CO** | | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 3 | 1 | 1 | 3 |

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively

**FT3003** **FABRIC MANUFACTURING** **L T P C**
**3 0 0 3**

**OBJECTIVES:**

To teach preparatory processes, primary and secondary mechanisms auxiliary, additional mechanisms of shuttle looms; weft insertion principles of shuttle less looms
To teach knitting process, principles of weft and warp knitting machines,
To teach principles involved in the manufacturing of nonwoven fabric

**UNIT I** **9**

**Basics of Woven Fabrics:** Different kinds of fabrics, Woven fabrics, Warp, Weft, Weaving; Preparatory processes for single and folded yarn
**Yarn Winding Machines**: Objectives, yarn passage in Cone Winding machine and Pirn Winding machine.
**Warping Machines:** Objectives, warp passage in Back beam warping machine and Sectional warping machine.
**Sizing and Gaiting:** Objects of sizing, sizing ingredients and its function; Drawing-in, Denting, and Knotting or Piecing; Gaiting

**UNIT II** **9**

**Basic Concepts of Loom:** Loom, Parts of Loom, Path of Warp in loom; Motions of Weaving –Primary, Secondary, and Auxiliary motions; Types of looms, Loom speed and Efficiency
**Primary Mechanisms:** Basic working principles of Tappet Shedding, Cone over Picking, Cone under Picking, Side lever Under Picking, Crank Beat-up, Timings of Primary Motions
**Secondary Mechanisms:** Negative Let-off mechanism, Positive Seven wheels Take-up mechanism.
**Objectives of Auxiliary Motions:** Temple, Brake/Starting handle, Warp stop, Warp protecting, Weft stop, Drop box

**UNIT III** **9**

**Other Shedding Devices:** Basic working principles Climax Dobby and Single lift single cylinder Jacquard
**Shuttle less looms:** Basic principles of weft insertion by Projectile, Single Rapier, Double Rapier, Air jet, water jet; Multi-phase weaving; Principles 3D fabric weaving
**Defects and Inspection:** Woven fabric Defects, Causes and Remedies; Fabric inspection, 4-points system, Classification of defects, Inspection procedure

**UNIT IV** **9**

**Classification of knitting processes** – weft knit and warp knit; yarn quality requirements for knitting; principles of knitting; types of knitting needles – Bearded, Latch &Compound needle; Weft
**knitting machines**: Principles of Flat knitting machine and Circular knitting machine, - Circular bearded needle single-jersey fabric machine, Revolving cylinder latch needle machine, Circular garment length machine
**Warp knitting machines:** needle bar, sinker bar, guide bar –pattern wheel –chain link-Warp knitting fundamentals- Knitting cycle for warp knitting- closed lap and open lap stitches – Raschel, compound needle and Tricot knitting machines- Comparison of raschel and tricot knitting machines

**UNIT V** 9

**Web preparation for nonwovens –** Principle, machines, processes for web preparation by dry laid, wet laid and air laid; web preparation by polymeric solution, Spun bonding and Melt blown process.

**Bonding of nonwoven:** Bonding methods- principles, machine; processes for mechanical, thermal, chemical bonding; Finishes, Properties and uses of nonwoven fabrics

**TOTAL: 45 PERIODS**

**OUTCOMES**:

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

CO1: Describe the objectives and principles of winding, warping machines and the objectives of sizing

CO2: Explain the basic concepts of loom and the working principle of primary, secondary, and auxiliary mechanisms of power loom

CO3: Explain the working principle of dobby, jacquard, and shuttle less looms; Describe the fabric defects, causes and remedies, procedure for fabric inspection

CO4: Describe the classification of knitted fabrics and explain the working principle of warp and weft knitting machines

CO5: Explain the principles involved in web preparation, bonding and finishing of nonwoven fabrics

**TEXT BOOKS:**

1. Talukdar M.K., Sriramulu P.K. and Ajgaonkar D.B., "Weaving: Machines, Mechanisms, Management", Mahajan Publishers, Ahmedabad, 1998, ISBN: 81-85401-16-0
2. Marks R. and Robinson T.C., "Principles of Weaving", The Textile Institute, Manchester, 1989, ISBN: 0 900739 258
3. Abhijit Majumdar, Principles of Woven Fabric Manufacturing 1st Edition, Kindle Edition ISBN-13 978-1498759113
4. Spencer D.J.,"Knitting Technology", III Ed.,Textile Institute, Manchester, 2001, ISBN:1855733331.
5. Samuel Raz., "Flat Knitting: The new generation", MeisenbachGmbH, Bamberg,1997, ISBN:3- 87525-054-0.
6. Samuel Raz.,"Warp Knitting production", MelliandTextilberichte, GmbH, Rohrbacher, 1987,ISB: 3-87529-022-4

**REFERENCES:**

1. PR. Lord and Mohammed, "Weaving: Conversion of yarn to fabric", M.H.Merrine Publishing Co. Ltd., VK, 1998. .
2. W.S. Murphy, "Hand Book of Weaving", Abhishek Publications 2001.
3. AjgaonkarD.B., "Knitting technology", Universal Publishing Corporation, Mumbai,1998, ISBN:0818502738/ISBN:9780818502736
4. Nonwoven Fabrics: Raw Materials, Manufacture, Applications, Characteristics, Testing Processes, Edited by Wilhelm Albrecht , Hilmar Fuchs and Walter Kittelmann, WILEY-VCH Verlag GmbH & Co. KgaA, Weinheim,, ISBN: 3-527-30406-1, 2003

**Course Articulation Matrix:**

| Course Outcomes | Statement | Program outcome | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
| CO1 | Describe the objectives and principles of winding, warping machines and the objectives of sizing | 3 | 2 | 2 | 1 | 2 | - | - | - | - | 1 | 2 | 2 | 3 | - | 2 |
| CO2 | Explain the basic concepts of loom and the working principle of primary, secondary, and auxiliary mechanisms of power loom | 3 | 2 | 2 | 1 | 2 | - | - | - | - | 1 | 2 | 2 | 3 | - | 2 |
| CO3 | Explain the working principle of dobby, jacquard, and shuttle less looms; Describe the fabric defects, causes and remedies, procedure for fabric inspection | 3 | 2 | 2 | 1 | 2 | - | - | - | - | 1 | 2 | 2 | 3 | - | 2 |
| CO4 | Describe the classification of knitted fabrics and explain the working principle of warp and weft knitting machines | 3 | 2 | 2 | 1 | 2 | - | - | - | - | 1 | 2 | 2 | 3 | - | 2 |
| CO5 | Explain the principle involved in web preparation, bonding and finishing of nonwoven fabrics | 3 | 2 | 2 | 1 | 2 | - | - | - | - | 1 | 2 | 2 | 3 | - | 2 |
| Overall CO | | 3 | 2 | 2 | 1 | 2 | - | - | - | - | 1 | 2 | 2 | 3 | - | 2 |

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively

**FT3004** **FABRIC STRUCTURES** **L T P C**
**3 0 0 3**

**OBJECTIVES:**
To teach the structures of basic, simple and compound weaves;
To teach the structures of pile and leno structures; graphing for spot and jacquard figuring;
To teach the different weft knit structures and warp knit structures

**UNIT I** **9**
**Basic Weaves:** Plain, Twill, Sateen, Warp Rib, Weft Rib, Mat; Draft and peg-plan of these weaves
**Simple Weaves:** Wavy Twill, Herring Bone, Diamond, Diaper; Ordinary Honey comb, Brighton Honey comb, Mock-leno, Huck-a-back, Crepe; Colour and weave effect; Draft and peg-plan of basic and simple weaves

**Unit II** **9**
**Compound Weaves:** Basic construction of – Plain face Bedford cord, Plain face welt, Twill face Warp Backed, Weft Backed structures; Plain face Extra Warp, Extra Weft structures produced by heald; Twill face self-stitched Double Cloth, Interchanging plain double cloth;

**UNIT III** **9**
**Pile Weaves and Leno:** Basic construction of - Warp pile-Velvet, Terry Pile, Weft Pile- Velveteen and Corduroy; Basic Leno structure
**Dobby and Jacquard Design:** Spot Figure graphing, Steps involved in graphing for figured fabrics, Basics of computer Aided Graph Designing.
**Characteristics, Commercial names and end uses** of the fabrics woven with different weaves of the course

**UNIT IV** **9**
**Weft knit structures**: Representation and characteristics of weft knit fabric structures -Single jersey, Rib, Purl, Interlock. Derivatives of single and double jersey structures: Accordion type of fabrics, plaited fabrics, 2X2 rib structure, half cardigan, full cardigan, eight lock, Ponte-di-Roma, Ottoman rib, Bourrelet, Texi- pique, Pin-tuck, Milano rib, French pique, Swiss pique.

**UNIT V** **9**
**Warp knit structures:** Representation and characteristics of warp knit fabric structures. Point Paper, Chain-Link Notation, single fabrics, Chain stitch, Tricot lap, Full tricot, Lock Knit, Reverse Lock Knit, satin, Loop raided fabrics, Queen's cord, Sharkskin, Blind lap, open work effects, Marquisette, sand- flair net, Hexagonal net.
**Characteristics, Commercial names and end uses** of the fabrics/garments woven with different weft and warp knit structures

**TOTAL: 45 PERIODS**

**OUTCOMES:**
Upon completion of this course, the student shall be able to
CO1: Design and describe the construction of basic weaves and simple weaves
CO2: Design and describe the construction of compound weaves
CO3: Design and describe the construction of pile weaves, jacquard designs, and define the commercial names of woven fabrics
CO4: Design and describe the weft knit structures
CO5: Design and describe the warp knit structures and define the commercial names of woven fabrics

**TEXTBOOKS**

1. Grosicki Z. J., “Watson’s Textile Design and Colour”, Vol.1, Woodhead Publications, Cambridge England, 2004, ISBN: 9781782420088
2. Grosicki Z. J., “Watson’s Advanced Textile Design and Colour”, Vol.II, Butterworths, London, 1989, ISBN: 9781845698522
3. D J Spencer, Knitting Technology: A Comprehensive Handbook and Practical Guide Woodhead Publishing Series in Textiles, 2001, ISBN 1855733331
4. N. Anbumani, Knitting Fundamentals Paperback, New Age International Publisher, 2007, ISBN: 8122419542

**REFERENCES**

1. W.S. Murphy, “Textile weaving and Design”, Abhishek Publications, 2007, ISBN: 9788182471664
2. H. Nisbet, “Grammar of Textile Design”, Taraporewala and Sons Co. Pvt. Ltd., 1994, ISBN: 1362902470
3. Wilson J., "Handbook of Textile Design", Textile Institute, Manchester, 2001, ISBN: 9781855735736
4. Seyam A. M., "Structural Design of Woven Fabrics, Theory and Practice", Textile Institute, Manchester, 2002, ISBN: 1870372395
5. Georner D, "Woven Structure and Design, part 1: Single Cloth Construction", WIRA, U.K., 1986, ISBN: 0900820179
6. Georner D, "Woven Structure and Design, Part 2: Compound Structures", WIRA, U.K.,1989, ISBN: 090366951X
7. Gokarneshan N., “Fabric Structure and Design”, New Age International (P) Limited, 2009, ISBN: 812241530X
8. Sadhan C. Ray, Fundamentals and Advances in Knitting Technology, Woodhead Publishing India in Textiles, 2015, ebook ISBN: 9780429083815

| Course Outcomes | Statement | Program outcome | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
| CO1 | Design and describe the construction of basic weaves and simple weaves | 3 | 2 | 2 | 1 | 2 | - | - | - | - | 1 | 2 | 2 | 3 | - | 2 |
| CO2 | Design and describe the construction of compound weaves | 3 | 2 | 2 | 1 | 2 | - | - | - | - | 1 | 2 | 2 | 3 | - | 2 |
| CO3 | Design and describe the construction of pile weaves, jacquard designs, and define the commercial names of woven fabrics | 3 | 2 | 2 | 1 | 2 | - | - | - | - | 1 | 2 | 2 | 3 | - | 2 |
| CO4 | Design and describe the weft knit structures | 3 | 2 | 2 | 1 | 2 | - | - | - | - | 1 | 2 | 2 | 3 | - | 2 |
| CO5 | Design and describe the warp knit structures and define the commercial names of woven fabrics | 3 | 2 | 2 | 1 | 2 | - | - | - | - | 1 | 2 | 2 | 3 | - | 2 |
| Overall CO | | 3 | 2 | 2 | 1 | 2 | - | - | - | - | 1 | 2 | 2 | 3 | - | 2 |

| Course Outcomes | Statement | Program outcome | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
| CO1 | Describe the objectives and principles of winding, warping machines and the objectives of sizing | 3 | 2 | 2 | 1 | 2 | - | - | - | - | 1 | 2 | 2 | 3 | - | 2 |
| CO2 | Explain the basic concepts of loom and the working principle of primary, secondary, and auxiliary mechanisms of power loom | 3 | 2 | 2 | 1 | 2 | - | - | - | - | 1 | 2 | 2 | 3 | - | 2 |
| CO3 | Explain the working principle of dobby, jacquard, and shuttle less looms; Describe the fabric defects, causes and remedies, procedure for fabric inspection | 3 | 2 | 2 | 1 | 2 | - | - | - | - | 1 | 2 | 2 | 3 | - | 2 |
| CO4 | Describe the classification of knitted fabrics and explain the working principle of warp and weft knitting machines | 3 | 2 | 2 | 1 | 2 | - | - | - | - | 1 | 2 | 2 | 3 | - | 2 |
| CO5 | Explain the principle involved in web preparation, bonding and finishing of nonwoven fabrics | 3 | 2 | 2 | 1 | 2 | - | - | - | - | 1 | 2 | 2 | 3 | - | 2 |
| Overall CO | | 3 | 2 | 2 | 1 | 2 | - | - | - | - | 1 | 2 | 2 | 3 | - | 2 |

**FT3005 CONCEPTS AND EVOLUTION OF FASHION AND DESIGN L T P C**
**3 0 0 3**

**OBJECTIVES:**

To introduce briefly the basic concepts of fashion and design to the students.
To acquaint the student with the history of fashion, its elements, traditional costumes of various cultures of the world,

**UNIT I** **6**

**Development of Figured Motif**; Forms – Natural, Geometrical, Artificial, and Abstract; Bases – Diamond, Ogee, and Diagonal; Arrangement – Plain, Twill, and Sateen; Principles – Half Drop Straight, and Half Drop Reverse.
**Garment design** – Classification - structural, decorative and functional.

**UNIT II** **12**

**Elements of Design** –line, shape, form, size, colour, texture and pattern;
**Principles of design** – Harmony, Balance, Rhythm, Emphasis and Proportion; introducing elements and principles of design in apparels.
**Colour** – definition; dimensions of colour-hue, value and intensity; colour harmonies, warm and cool colours; advancing and receding colours; colour theories – Prang colour system and Munsell colour system;.

**UNIT III** **9**

**Fashion fundamentals**– definition, tangibles and intangibles of fashion; fashion life cycle; factors influencing fashion; fashion adoption theories.
**Fashion terminology** -street fashion, recurring fashion, mass fashion, fashion trend, fashion shows, style, chic, boutique, Haute Couture; role of a fashion designer.

**UNIT IV** **9**

**History of world costumes –**principle garments and textiles of Egyptian, Greek, medieval English, Renaissance French costumes
**History of Indian costumes –** Ancient garments during the Mauryan and Guptha period
**Traditional Indian costumes -** Tamil Nadu, Kerala, Gujarat, Rajasthan, Bengal, Manipur, Jammu & Kashmir, Manipur, Orissa, Maharashtra

**UNIT V** **9**

**Traditional Indian textiles:** Motifs, colour combinations and designs of **Hand-woven Textiles** - Banaras Brocades, Jamdani Saris, Paithani Saris, Kanchipuram Saris, Chanderi Saris **Printed Textiles** - Bagru prints from Rajasthan, Kalamkari from Andhra Pradesh. **Embroidered Textiles** - Kashida, Phulkari, Chamba, Rumal, Chikankari, Phool Patti ka Kaam, Zardozi, Kasuti, Kantha, Pipli Applique. **Resist Dyed Textiles** - Bandhani, Bandhej & Lehariya of Rajasthan, Ikat and Patola of Gujarat.

**45 periods**

**OUTCOMES:**

Upon the completion of this course, the students shall understand the basic concepts of fashion and design, colour basics, dimensions, categories and their characteristics.
Upon completion of the course, the student would develop an understanding of fashion evolution and fashion designing

**TEXT BOOKS:**

1. Vandana Bhenderi, “Costume, Textiles and Jewellery of India – Traditions in Rajasthan”,

Prakash Books, New Delhi, 2004.
2. Fillow J and Bernard N Thomas and Hudson, “Traditional Indian Textiles”, Prentice Hall, India,1993.
3. Alkazi, Roshen. *Ancient Indian Costume*. [New Delhi]: Art Heritage, 1983.

**REFERENCES:**

1. Hart A North S V and A Museum, “Historical Fashion in detail the 17th and 18th Centuries”, McMillan, India, 1998.
2. Kathy Alert, "Traditional folk costumes of Europe paper dolls in full color”, Dover publications, Inc., Newyork,1984.
3. Diane T. and Cassidy T., “Colour forecasting”, Blackwell Publishing, 2005, ISBN: 1405121203 / ISBN: 978-1405121200.
4. Elaine Stone and Jean A. Samples, “Fashion Merchandising”, McGraw-Hill Book Company, 1985, ISBN: 0070617422.
5. Marian L. Davis, “Visual Design and Dress”, Prentice Hall, New Jersey, 1996, ISBN: 0131121294 / ISBN: 978-0131121294.
6. Naik, S. D., Traditional embroideries of India. 1996, APH Publishing.

**FT3311 FABRIC STRUCTURE LAB L T P C**
**0 0 3 1.5**

**OBJECTIVE:**

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

**Analysis of construction details of the following fabric structure**

1. Plain and its derivatives
2. Twill and its derivatives
3. Satin & Sateen ( Regular and irregular)
4. Honeycomb (ordinary and Brighton)
5. Huck-a-back & Mock-leno
6. Extra warp and extra weft figuring
7. Pile fabrics (warp and weft)
8. Bedford cord &Backed fabrics
9. Gauze and Leno
10. Double cloth
11. Crepe
12. Tapestry
13. Basic Weft knitted strictures
14. Basic Warp knitted structure
15. Basic Non Wovens structures

**TOTAL: 60 PERIODS**

**OUTCOMES:**

Upon completion of the lab the student will be able

Identify the constructional parameters of fabric

Construct design, draft and peg plan for weaving the fabric

Analyse the blend composition of yarn used in the fabric and the type of finish applied in the fabric

**LAB EQUIPMENTS:**

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS

1. GSM Cutter – 3 Nos.
2. Beesley Balance – 2 Nos.
3. Crimp Tester – 2 Nos.
4. Electronic balance – 1 No.

**FT3312 FASHION ILLUSTRATION LABORATORY L T P C**
**0 0 3 1.5**

**COURSE OBJECTIVES**

- To train the students in fashion illustration

**LIST OF EXPERIMENTS**

1. Motif Development – Design Repeat and positioning.
2. Object Drawing and Shading concepts.
3. Drape of fabrics and shading with different mediums.
4. Preparing swatches for dimensions of colour, different colour theories and harmonies.
5. Rendering prints and textures with various fabric constructions (wovens, non-wovens and knit).
6. Drawing different Silhouettes and garment components - sleeves, collars, necklines, cuffs, skirts, pants.
7. Human Anatomy- Figure basics, Constant proportions, Shapes and parts of human body. Study of different postures- Head- Face, Hand, Leg.
8. Normal Drawing - Eight head theory. Fashion Figure Drawing - Drawing croqui figures-stick, geometric, flesh - 8 ½ and 10 head figures.
9. Different postures of male and female figure - ¾ view, back view, side view. Different poses like – S-Pose, X-Pose, and T-pose.
10. Drawing croqui figures using template, model, imagination and photograph.
11. Create a mood board based on a selected theme.
12. Develop garments on croqui figures (Male and female) deriving inspirations from the developed mood board.

**TOTAL: 60 PERIODS**

**COURSE OUTCOMES**

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

LIST OF EQUIPMENT REQUIRED FOR 30 STUDENTS

Drawing tables - 15 Nos.

| Course Outcomes | Statement | Program Outcome | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO11 | PO12 | PSO 1 | PSO 2 | PSO 3 |
| CO1 | To learn motif development, drawing objects and shading concepts | 1 | - | 1 | 1 | 3 | 1 | 2 | 1 | 1 | 3 | 1 | 2 | 3 | 3 | 3 |
| CO2 | To learn drape of fabrics and shading with different mediums. | 1 | 1 | 1 | 1 | 3 | 1 | 2 | 1 | 1 | 3 | 1 | 2 | 3 | 3 | 3 |
| CO3 | To learn how to illustrate different fabric swatches and garment components | 1 | 1 | 1 | 1 | 3 | 1 | 2 | 1 | 1 | 3 | 1 | 2 | 3 | 3 | 3 |
| CO4 | To understand human anatomy and learn how to illustrate basic figures | 1 | 1 | 1 | 3 | 3 | 1 | 2 | 1 | 3 | 3 | 1 | 2 | 3 | 3 | 3 |
| CO5 | To learn how to create a mood board based on a selected theme and develop garment designs | 1 | 1 | 1 | 3 | 3 | 1 | 2 | 1 | 3 | 3 | 1 | 2 | 3 | 3 | 3 |
| **Overall CO** | | 1 | 1 | 1 | 2 | 3 | - | 2 | - | - | 3 | 1 | 2 | 3 | 3 | 3 |

**FT3401 APPAREL PRODUCTION MACHINERY L T P C**
**3 0 0 3**

**COURSE OBJECTIVES**

- To impart knowledge on the machineries and equipments used for garment production
- To instruct on latest developments in the garment production machineries.

**UNIT I SPREADING MACHINES 9**

Fabric inspection machines, Types of Fabric Packages. Types of Fabrics – One Way – Two Way Fabrics – Their effect on spreading. Methods of Fabric spreading. Types of Spreading machines.Limitations and control parameters in spreading .Marker planning, Marker efficiency, Factors affecting marker efficiency.

**UNIT II CUTTING MACHINES 9**

Introduction to cutting machines. Types and functions of cutting machines – straight knife, round knife, band knife cutting machines. Notches, drills, die cutting machines. Types of Computerised cutting machines and its functiona advantages. Maintenance &safety measures of cutting machines.

**UNIT III SEWING MACHINES 9**

Basic parts of sewing machine –primary and auxiliary parts and their functions. Bobbin case / Bobbin hook, Throat plate– Take up devices – Tensioners – Feed dog – Pressure foot. Types of needles – Parts of needles and their function. Needle finishes. Adjustments of Stand height – pedal – Needle Bar – Stitch length selection – Feed timing – Needle and Bobbin Thread Tension – Stitch cycle timing diagram; Classifications of sewing machines ; Basic parts and functions of chain and SNLS sewing machines. Maintenance &safety measures of machines.

**UNIT IV MULTI THREAD SEWING MACHINES 9**

Over lock machines - Types of Over lock machines. Parts and their functions. Threading diagram for over lock machines. Stitch Cycle Diagram for over lock machines – Adjustment of Needle height, Feed dog height, angle, Differential feed ratio, Position of upper and lower knives, loopers. Defects and Remedies. Flat lock machines – Types. Parts and their functions. Threading diagram of flat lock machines – Stitch cycle diagram. Adjustment of parts – Needle height, feed dog height, differential feed ratio, loopers. Maintenance &safety measures of machines.

**UNIT V SPECIALISED SEWING MACHINES 9**

Special sewing machines – Button hole and button sewimg machines. Parts and their Functions .threading diagram. Rib cutting machine-Zig zag and feed off the arm machine Parts and their functions. threading diagram ; automation in sewing machine; Funtions and merits of computerized sewing machines; usage of special attachments and tools for operation simplifications .Maintenance &safety measures of machines

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES**

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

- Acquire knowledge in different methods of spreading of fabrics with respect to type of fabric and to calculate the marker efficiency.
- Describe the basic principles of working of different types of cutting machineries used in apparel production.
- Develop skill in setting and adjustment parts of sewing machines.
- Develop skills for recognize various parts and their working principles in advanced
- garment sewing machines.

- Acquire knowledge on special machineries used in apparel production

**TEXT BOOKS:**

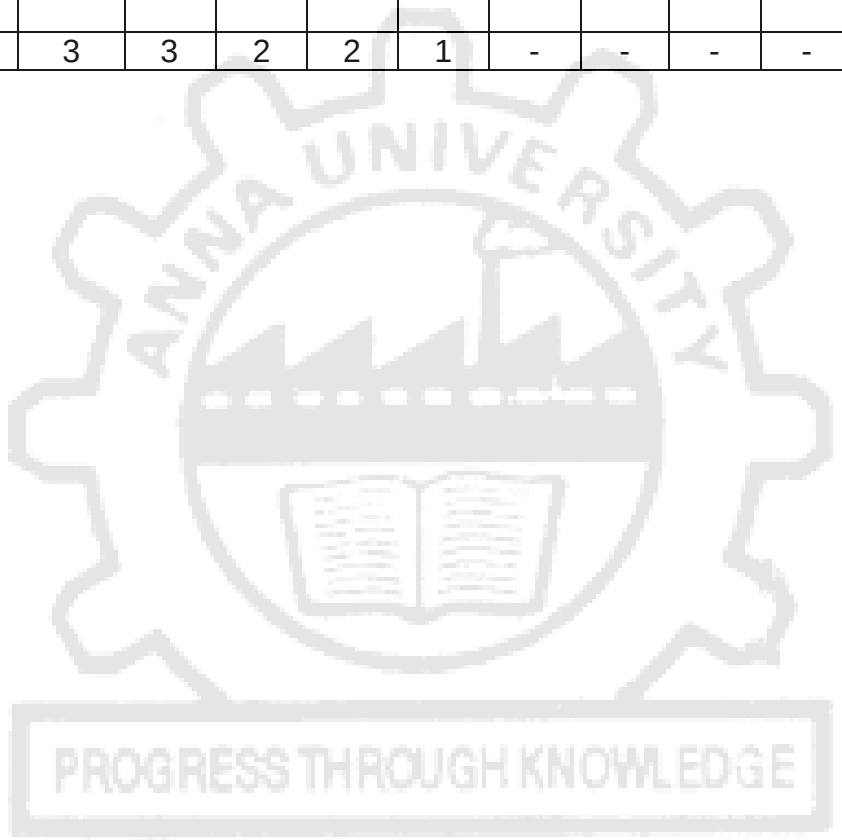
1. Harold Carr and Barbara Latham, The Technology of Clothing Manufacture, Om Book Service, 2002.
2. Shaeffer Claire, Sewing for the Apparel Industry, Prentice Hall, New Jersey, 2001.

**REFERENCES:**

1. Singer, "Sewing Lingerie", Cy DeCosse Incorporated, 1991.
2. Laing R.M. and Webster J, "Stitches and Seams", The Textile Institute, Manchester, 1999
3. Technical Advisory Committee of AAMA, "A New Look at Apparel Mechanization", 1978.
4. Jacob Solinger, Apparel Production Handbook, Reinhold Publications, 1998.

| Course Outcomes | Statement | Program Outcome | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| CO1 | Understand different types of fabric laying methods, spreading machines and its control methods | 1 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | - | 3 | 3 | 3 | 3 |
| CO2 | Understand different types of cutting machines and its control methods | 1 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | - | 3 | 3 | 3 | 3 |
| CO3 | Introduction to sewing machine and its basic parts, functions and its safety measures | 1 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | - | 3 | 3 | 3 | 3 |
| CO4 | Introduction to different types of multi thread sewing machines and its purpose | 1 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | - | 3 | 3 | 3 | 3 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO5 | Understand special sewing machines, its purpose and control measures | 1 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | - | 3 | 3 | 3 | 3 |
| **Overall CO** | | 1 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | - | 3 | 3 | 3 | 3 |



**FT3402 FABRIC AND GARMENT QUALITY EVALUATION L T P C**
**3 0 2 4**

**OBJECTIVE:**

To infuse understanding of yarn, fabric and apparel testing methods

**UNIT I CONSTRUCTION CHARACTERISTICS & SAMPLING TECHNIQUES 9**

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

**Fabric sampling techniques** Definition– random, biased sampling. Terms used in sampling. Sampling techniques for fibre, yarn and fabric. Moisture Regain and Moisture Content. Standard conditions for testing samples.

**UNIT II MECHANICAL PROPERTIES 9**

Tensile strength measurement – ravelled strip test and grab test – mechanical and electronic measuring systems. Tear strength – importance – measuring systems. Bursting strength and its measurement. Ballistic impact strength. Universal tensile tester - principle and operation. Fabric Abrasion Resistance – Martindale abrasion tester. Fabric Pilling - I.C.I Pillbox tester. Crimp– Influence of crimp on fabric properties–Shirley crimp tester.

**UNIT III APPAREL COMFORT AND ACCESSORY TESTING 9**

Fabric stiffness – principle of measurement of flexural rigidity; Drapeability – measurement of drape coefficient; Crease recovery measurement techniques. Wrinkle recovery assessment using standard grades; Principle and functioning of air permeability testers, water repellency, contact angle and fabric shrinkage testing.

**ACCESSORY TESTING**

Seam strength and seam slippage testing. Peel bond strength testing-Button, Zipper strength testing. Colour fastness testing – Washing, Rubbing, Light, Perspiration fastness. Apparel dimensional stability – spirality.

**UNIT IV LOW STRESS CHARACTERISTICS 9**

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

**UNIT V FABRIC AND GARMENT INSPECTION 9**

Fabric inspection – 4-point system, 10 point system, classification of fabric defects, independent product quality certification, acceptable quality level, Inspection of garments and garment defects - sewing, pressing, finishing and packaging defects.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

The student will have knowledge on

Methods by which the physical and mechanical properties of textile materials and products are measured and investigated

Sampling and yarn quality parameters testing

Fabric and garment quality parameters testing

**TEXT BOOKS:**

1. Booth J.E., “Principle of Textile Testing”, Butterworth Publications, London, 1989
2. Kothari V. K., “Testing and Quality Management”, Progress in Textile Technology Vol.1, IAFL Publications, New Delhi, 1999
3. Sara J. Kadolph., “Quality Assurance for Textiles and Apparels”, Fair Child Publications, New York, 1998.
4. Apurba Das., and Alagirusamy R., “Science in clothing comfort”, Wood head Publishing India Pvt. Ltd., India, 2010, ISBN: 1845697898 | ISBN-13: 9781845697891.

**REFERENCES**:

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

| Course Outcomes | Statement | Program Outcome | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO 3 |
| CO1 | Identification of construction characteristics and sampling methods | 3 | 3 | 1 | 2 | 1 | 2 | 1 | 3 | 1 | 1 | 2 | 2 | 1 | 1 | 2 |
| CO2 | Principle and operation of mechanical characteristics | 3 | 3 | 1 | 2 | 1 | 2 | 1 | 3 | 1 | 1 | 2 | 2 | 1 | 1 | 2 |
| CO3 | Principle and operation of apparel comfort and accessories characteristics | 3 | 3 | 1 | 2 | 1 | 2 | 1 | 3 | 1 | 1 | 2 | 2 | 1 | 1 | 2 |
| CO4 | Principle and operation of low stress and thermal characteristics | 3 | 3 | 1 | 2 | 1 | 2 | 1 | 3 | 1 | 1 | 2 | 2 | 1 | 1 | 2 |
| CO5 | Principle and operation of fabric and garment inspection | 3 | 3 | 1 | 2 | 1 | 2 | 1 | 3 | 1 | 1 | 2 | 2 | 1 | 1 | 2 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Overall CO** | 3 | 3 | 1 | 2 | 1 | 2 | 1 | 3 | 1 | 1 | 2 | 2 | 1 | 1 | 2 |

Course Articulation Matrix:

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) andubstantial (High) respectively

**LIST OF EXPERIMENTS:** **TOTAL: 30 PERIODS**

1. Determination of Yarn Count and Lea Strength
2. Determination of Single / Ply Yarn Twist
3. Determination of Yarn Appearance Grade
4. Determination of Fabric Abrasion Resistance and pilling
5. Determination of Fabric Tensile Strength
6. Determination of Color Fastness to Rubbing - Crock meter
7. Determination of Fabric Stiffness and Crease Recovery Angle
8. Determination of Fabric bursting strength and fabric Drape.
9. Determination of fabric tear strength.
10. Determination of colorfastness to perspiration.
11. Determination of shrinkage of woven and knitted fabrics.
12. Determination of Seam Strength, Seam Slippage, zipper strength, button pull strength
13. Determination of Peel bond strength of fusible interlinings
14. Determination of Wickability and wettability of fabric
15. Determination of Spirality and Course length of Knitted fabrics

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

- Baer Sorter - 1 No.
- Fibre Fineness tester - 1 No.
- Projection Microscope - 1 No.
- Wrap Reel - 1 No.
- Wrap Block - 1 No.
- Yarn Twist 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.
- Universal Testing machine - 1 No.
- Spirality Equipment – 1 No
- Seam strength, Slippage, Peel bond, zipper strength, button pull strength Jaws – 1 No

**FT3403 FUNDAMENTALS OF GARMENT MANUFACTRING L T P C**
**3 0 0 3**

**OBJECTIVES:**

To introduce briefly the fundamentals of garment manufacture to the students

**UNIT I APPAREL INDUSTRY PROCESS FLOW 9**

Introduction to Indian apparel industry. Structure of an apparel industry-work flow, Pre production planning; types of samples and sample approval; Technical pack, Specification sheet – preparation, analysing and approvals. Preparation of proto pattern and developing production pattern.

**UNIT II RAW MATERIAL SELECTION 9**

Types and applications of garment accessories and trims – Labels, linnings, inter-linnings, waddings, lace, braid, elastic, hook and loop fastners, shoulder pads, eyelets, zip fastners, buttons, rivets. Characteristics of sewing threads, types, construction and seam performance. Stitch types and uses; seam types and uses; Stitches and seam defects

.

**UNIT III PATTERN LAYOUT PLANNING 9**

Objectives and requirements of fabric inspection, spreading - modes of spreading, different fabric packages, spreading tension, uniformity and alignment. Importance of grain in garment performance. Principles and types of layout and marker planning - woven fabric lay, knitted fabric lay, types of fabric lay and Marker efficiency. Principles of cutting and cut order plan, bundling and numbering. Control parameters and planning for inspection to numbering

**UNIT IV PRODUCTION SYSTEMS 9**

Production systems- individual system; Factory production system- Progressive Bundle System, Unit Production System , Modular Production System .quality control in swing section, assembly of garment components and operational break down

**UNIT V APPAREL FINISHING PROCESS 9**

Fusing requirements and process; stain removal process and machine, ironing and pressing process and machines. Packaging – types, functions and suitable machines– types of packaging forms

**TOTAL: 45 PERIODS**

**OUTCOMES:**

Upon completion of this course, the students shall understand
Basics structure of apparel industry and production planning
Factors involved in house production process
Primary stitches and seams used in sewing
Various garment accessories and inspection process

**TEXT BOOKS:**

1. Harrold Carr., and Barbara Latham., “The Technology of Clothing Manufacture” Backwell Science, U.K., 1994,ISBN: 0632037482 | ISBN-13: 9780632037483.
2. Gerry Cooklin., Steven George Hayes., and John McLoughlin., “Introduction to Clothing Manufacture”, Wiley-Blackwell Science, U.K., 2006, ISBN: 0632058463 | ISBN-13:9780632058464.

**REFERENCES:**

1. Richard M. Jones., “The Apparel Industry”, Blackwell Science, U.K., 2006, ISBN: 1405135999 |ISBN-13: 9781405135993.
2. Kantilal Ila., “Apparel Industry in India”, NICTAS Publication,

Ahmedabad, 1990, ISBN:8185472009 | ISBN-13: 9788185472003.
3. Raj kishore Nayak., and Rajiv Pandhya.,"Garment Manufacturing Technology", Woodhead publications 2015, ISBN: 1782422323 | ISBN-13: 9781782422327.
4. ChutterA. J., "Introduction to Clothing Production Management", Wiley-Blackwell Science, U.K., 1995, ISBN: 0632039396 | ISBN-13: 9780632039395.
5. Harold Carr, "The Clothing Factory", Clothing and Footwear Institute, 1972. ISBN: B0012PP566.
6. Miller E., "Textile Properties and Behaviour in Clothing use", Batsford Publication, 1992, ISBN:0713472359 | ISBN-13: 9780713472356.
7. Cooklin G., "Fusing Technology", The Textile Institute, Manchester, 1990, ISBN: 1870812204 |ISBN-13: 9781870812207.
8. Jay Diamond., "Fashion Apparel and Accessories", Delmar Publication, 1994, ISBN: 0827356242 | ISBN-13: 9780827356245.

**FT3404 PATTERN ENGINEERING L T P C**
**3 0 0 3**

**COURSE OBJECTIVES**

- To enhance the fundamental knowledge in human anthropometrics from the scientific and technological viewpoint
- To equip students with comprehensive pattern making skills

**UNIT I STUDY OF BODY MEASUREMENTS AND SIZING SYSTEMS 6**

Anthropometry- Human Anatomy, Body Ideals-Eight head theory: body proportions, height and weight distribution. Important body measurements for children, men and women across all age groups - Clothing sizing systems - Methods of measuring body dimensions, Standard measurement chart-designation and control dimensions. Landmark terms.

**UNIT II BASICS OF PATTERN MAKING 15**

Introduction to pattern making and methods. Functions of pattern making tools, Preparing and Measuring the Form, Pattern making terminologies, Development of pattern - Drafting and draping methods - Basic men's block - bodice, sleeves trousers, and women's block - bodice, sleeves, trousers, skirt.

**UNIT III PATTERN ALTERATIONS AND GRADING 6**

Pattern alteration for fit, Factors affecting the pattern making process. Grading process, grade rules, and types of grading system.

**UNIT IV TECHNIQUES OF PATTERN MAKING 9**

Dart manipulation- single dart series-slash-spread technique, pivotal transfer technique. Two dart series- slash spread and pivotal transfer technique. Graduated and radiating darts. Parallel, asymmetric and intersecting darts. Types of added fullness and Contouring Principle.

**UNIT V PATTERNS FOR COLLARS AND SLEEVES 9**

Collar classification and terms, basic shirt collar, Peter Pan collar, sailor collar, mandarin collar, built-up neck lines, Cowls, Sleeve cap, sleeve cuffs, puff, petal, lantern and leg-of-mutton sleeves.

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES**

Upon completion of this course, the student would be able to
CO1: Understand Anthropometry related concepts and important body measurements
CO2: Prepare patterns for basic blocks using drafting and draping techniques
CO3: Develop knowledge on the techniques involved in grading and in pattern alteration
CO4: Apply dart manipulation techniques to design, variation in garment components
CO5: Prepare patterns for basic collar and sleeve components

| Course Outcomes | Program Outcome | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO10 | PO 11 | PO 12 | PSO 1 | PSO 2 | PSO3 |
| CO1 | 2 | 2 | 2 | 2 | 3 | - | - | - | 1 | - | - | - | 2 | - | 2 |
| CO2 | 2 | 2 | 2 | 2 | 3 | - | - | - | 1 | - | - | - | 2 | - | 2 |
| CO3 | 2 | 2 | 2 | 2 | 3 | - | - | - | 1 | - | - | - | 2 | - | 2 |
| CO4 | 2 | 2 | 2 | 2 | 3 | - | - | - | 1 | - | - | - | 2 | - | 2 |
| CO5 | 2 | 2 | 2 | 2 | 3 | - | - | - | 1 | - | - | - | 2 | - | 2 |
| Overall CO | 2 | 2 | 2 | 2 | 3 | - | - | - | 1 | - | - | - | 2 | - | 2 |

**TEXT BOOKS:**


1. Harrold Carr., and Barbara Latham., "The Technology of Clothing Manufacture" Backwell Science, U.K., 1994,ISBN: 0632037482 | ISBN-13: 9780632037483.
2. Gerry Cooklin., Steven George Hayes., and John McLoughlin., "Introduction to Clothing Manufacture", Wiley-Blackwell Science, U.K., 2006, ISBN: 0632058463 | ISBN-13:9780632058464.
3. Helen Joseph Armstrong, "Pattern Making for Fashion Design" Pearson Education (Singapore)Pvt. Ltd.,2005 2. Winifred Aldrich, "Metric Pattern Cutting" Blackwell Science Ltd., 1994


REFERENCES:


1. Gerry Cooklin, "Master Patterns and Grading for Women's Outsizes", Blackwell Scientific Publications, 1995.
2. Gerry Cooklin, "Master Patterns and Grading for Men's Outsize", Blackwell Scientific Publications, 1992.
3. Jeenne Price and Bernard Zamkoff, "Grading Techniques for Modern Design" Fairchild Publications, 1990.
4. Amaden-Crawford Connie, "The Art of Fashion Draping (3rd edition)" Om Books International Publications, 2005
5. Winifred Aldrich, "Metric Pattern Cutting" Blackwell Science Ltd., 1994

**FT3405 TEXTILE CHEMICAL PROCESSING L T P C**
**3 0 0 3**

**OBJECTIVES:**

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

**UNIT I PREPARATORY PROCESSES 9**

Introduction - Process sequence of wet processing for wovens and knits. Singeing electric and gas singeing. Desizing hydrolytic, oxidative and enzymatic. Scouring alkaline and enzymatic. Bleaching - hypochlorite, peroxide and sodium chlorite bleaching. Optical whitening. Mercerizing tension, tensionless and tubular mercerization.

**UNIT II DYEING 9**

Dyeing equipment - jigger, winch, soft flow, jet dyeing, J-box, padding mangles, package dyeing and garment dyeing machine. Classification of dyes. Dyeing of cotton using direct, reactive, vat and sulphur dyes. Dyeing of polyester using carrier, HTHP and thermo sol. Dyeing of cellulosic blends (one bath and two bath process).

**UNIT III PRINTING**: 9

Ingredients of print paste. Styles of printing - direct, discharge, resist, tie and dye and batik. Methods of printing - block, stencil, roller, rotary, flat bed, transfer and chest printing. Special prints -flock, foam, foil, glitter, kadi, leather, pearl and rubber. After treatments of printed goods.

**UNIT IV FINISHING 9**

Mechanical finishing -raising, shearing, sueding, anti-shrink finish, compacting, decatizing, calendaring, embossing. Chemical finishing - softening, crease resist, bio polishing, flame retardant, water repellent, water proof, soil release, antimicrobial, UV protection finish. Denim washing - stone washing, acid washing, sand blasting.

**UNIT V COMPUTER COLOR MATCHING CONCEPTS 9**

Color; Electromagnetic spectrum - visible range, measurement of color strength - color matching - theory and applications. Spectrophotometer and color matching systems. Quality control using color matching systems, color difference - pass / fail system and shade sorting

**`TOTAL: 45 PERIODS**

**Course Outcomes**

| | |
|---|---|
| **CO1** | Understand the preparatory process in chemical processing |
| **CO2** | Explain the classes, machines, stages, and application of dyes |
| **CO3** | Discuss about the ingredients, types and machines and faults of printing |
| **CO4** | Understand the various methods and application of finishing |
| **CO5** | Understand and measure the strength of colour and colour difference |

**TEXT BOOKS:**

1. Trotman E. R., “Dyeing and Chemical Technology of Textile Fibres”, B.I Publishing Pvt. Ltd., New Delhi, 1994, ISBN: 0471809101 | ISBN-13: 9780471809104
2. Karmarkar S.R., “Chemical Technology in Pre-treatment processes of Textiles”, Elsevier Publications, Newyork,1999, ISBN: 044450060X | ISBN-13: 9780444500601
   Shenai V. A., “Chemistry of Dyes and Principles of Dyeing”, Sevak Publications, Mumbai, 1995, ISBN: B0007BFE9Y
3. Shenai V. A., “Technology of Printing”, Sevak Publications, Mumbai, 1996
4. Miles W. C., “Textile Printing”, Wood head Publication, 2003, ISBN 0 901956 76 1

**REFERENCES:**

1. Hall A.J., “Textile Finishing”, 2nd ed., McGraw Hill, 1995.
2. Marsh J.T., “Introduction to Textile Finishing” Vol. II, New Age, 1996
3. Heywood D.,”Textile Finishing”, Woodhead Publishing Ltd.,2003 ISBN 090195681
4. Shenai V.A., “Technology of Finishing”, Vol. X, Usha, 1998
5. Schindler W.D and Hauser P., “Chemical Finishing of Textiles”, Wood head Publications, ISBN: 1855739054.
6. Yin-Ling Lam , Chi-Wai Kan & Chun-Wah Marcus Yuen, "Developments in functional finishing of cotton fibres – wrinkle-resistant, flameretardant and antimicrobial treatments", Textile Progress, Vol. 44, Nos. 3 - 4, September-December 2012,175–249.
7. Jones B. W., “Garment Dyeing: Ready to Wear Fashion from the Dyehouse”, Textile Progress, Vol. 19, No. 2, 1988, ISBN 1870812131.
8. Roshan Paul (Ed.), "Denim – Manufacture, Finishing and Applications", Woodhead Publishing, 2015.
9. Reife A. and Freeman H.S., “Environmental Chemistry of Dyes and Pigments”, Wiley, 1996, ISBN: 0471589276

| Course Outcomes | Statement | Program Outcome | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO10 | PO11 | PO12 | PSO 1 | PSO 2 | PSO 3 |
| CO1 | Understand the preparatory process in chemical processing | 3 | 3 | 2 | 2 | - | - | - | - | 3 | - | - | 2 | 2 | 1 | 2 |
| CO2 | Explain the classes, machines, stages, and application of dyes | 3 | 3 | 2 | 2 | - | - | - | - | 2 | - | - | 2 | 2 | 1 | 2 |
| CO3 | Discuss about the ingredients, types and machines and faults of printing | 3 | 2 | 1 | 1 | - | - | - | - | 2 | - | - | 1 | 1 | 1 | 2 |
| CO4 | Understand the various methods and application of finishing | 2 | 3 | 2 | 2 | - | - | - | - | 2 | - | - | 2 | 2 | - | 2 |
| CO5 | Understand and measure the strength of colour and colour difference | 2 | 3 | 2 | 2 | - | - | - | - | 3 | - | - | 2 | 1 | - | 2 |
| **Overall CO** | | 3 | 3 | 2 | 2 | - | - | - | - | 3 | - | - | 2 | 2 | 1 | 2 |

**GE3451 ENVIRONMENTAL SCIENCES AND SUSTAINABILITY L T P C**
**2 0 0 2**

**UNIT - I : ENVIRONMENT AND BIODIVERSITY 6**

Definition, scope and importance of environment – need for public awareness. Eco-system and Energy flow– ecological succession. Types of biodiversity: genetic, species and ecosystem diversity– values of biodiversity, India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ.

**UNIT – II: ENVIRONMENTAL POLLUTION 6**

Causes, Effects and Preventive measures of Water, Soil, Air and Noise Pollutions. Solid, Hazardous and E-Waste management. Case studies on Occupational Health and Safety Management system (OHASMS). Environmental protection, Environmental protection acts.

**UNIT – III: RENEWABLE SOURCES OF ENERGY. 6**

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 6**

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 6**

Zero waste and R concept, Circular economy, ISO 14000 Series, Material Life cycle assessment, Environmental Impact Assessment. Sustainable habitat: Green buildings, Green materials, Energy efficiency, Sustainable transports. Sustainable energy: Non-conventional Sources, Energy Cycles-carbon cycle, emission and sequestration, Green Engineering: Sustainable urbanization-Socio-economic and technological change.

**TOTAL: 30 PERIODS**

**TEXT BOOKS:**

1. Anubha Kaushik and C. P. Kaushik's "Perspectives in Environmental Studies", 6th Edition, New Age International Publishers ,2018.
2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2016.
3. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004.
4. Allen, D. T. and Shonnard, D. R., Sustainability Engineering: Concepts, Design and Case Studies, Prentice Hall.
5. Bradley. A.S; Adebayo, A.O., Maria, P. Engineering applications in sustainable design and development, Cengage learning.
6. Environment Impact Assessment Guidelines, Notification of Government of India, 2006.
7. Mackenthun, K.M., Basic Concepts in Environmental Management, Lewis Publication, London, 1998.

**REFERENCE BOOKS:**

1. R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media. 38 .
2. Cunningham, W.P. Cooper, T.H. Gorhani, 'Environmental Encyclopedia', Jaico Publ., House, Mumbai, 2001.

3. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT. LTD, New Delhi, 2007.
4. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, 2005.
5. Erach Bharucha "Textbook of Environmental Studies for Undergraduate Courses" Orient Blackswan Pvt. Ltd. 2013.

**FT3411 COMPUTER AIDED FASHION DESIGNING LABORATORY** **L T P C**
**0 0 2 1**

**COURSE OBJECTIVES**

- To train the students in CAD used for designing of garments.

**LIST OF EXPERIMENTS**

1. Introduction to tools and workspace of image editing software & vector software
2. Development of motifs suitable for printed textile and woven textile
3. Development of woven fabrics designs – plain, twill, satin and denim
4. Development of technical diagrams –T-shirt and trousers
5. Illustration of Kid's romper (all over print)
6. Illustration of Kid's frock (lace)
7. Illustration of Men's T-shirt with a chest print design
8. Illustration of Men's Basic formal shirt (checks and plaids)
9. Illustration of Men's Basic trouser (solid combos)
10. Illustration of Women's long dress (all over print)
11. Illustration of children's school uniform.
12. Illustration of Women's maternity wear with functionality.

**TOTAL: 60 PERIODS**

**COURSE OUTCOMES**

Upon completion of this course the student will have practical experience on garment designing and illustrating the same.

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS

Computer with image editing software and sketching software - 15Users.

Color Printer - 01No.

| Course Outcomes | Statement | Program Outcome | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO11 | PO12 | PSO 1 | PSO 2 | PSO 3 |
| CO1 | To learn how to develop textile print design | 1 | 1 | 1 | 1 | 3 | - | - | - | 2 | 2 | 2 | 3 | 3 | 2 | 3 |
| CO2 | To learn how to develop fabric design | 1 | 1 | 1 | 1 | 3 | - | - | - | 2 | 2 | 2 | 3 | 3 | 2 | 3 |
| CO3 | To learn how to develop technical drawings | 1 | 1 | 1 | 1 | 3 | - | - | - | 2 | 2 | 2 | 3 | 3 | 2 | 3 |
| CO4 | To learn how to illustrate different kid's garments | 1 | 1 | 1 | 1 | 3 | - | - | - | 2 | 2 | 2 | 3 | 3 | 2 | 3 |
| CO5 | To learn how to illustrate different men's and women's garments | 1 | 1 | 1 | 1 | 3 | - | - | - | 2 | 2 | 2 | 3 | 3 | 2 | 3 |
| **Overall CO** | | 1 | 1 | 1 | 1 | 3 | - | - | - | 2 | 2 | 2 | 3 | 3 | 2 | 3 |

**FT3412 BASICS OF PATTERN MAKING AND GARMENT CONSTRUCTION LABORATORY**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

**COURSE OBJECTIVES**

- To train the students in pattern making of apparels.
- To train the students in fundamentals of garment construction.

**LIST OF EQUIPMENTS**

1. Measuring the dress form kid's, male and female.
2. Drafting and grading the basic pattern set for kid's top, male shirt and female top.
3. Drafting and grading the basic pattern set for kid's bottom, male trouser and female skirt & trouser
4. Techniques of pattern making (slash and spread, pivoted technique)
5. Developing basic patterns using Draping methods – Bodice, Bodice with dart variations, Sleeve
6. Developing patterns using Draping methods – Skirt, Cowl Necklines
7. Developing patterns using Draping methods – Men's trousers
8. Preparing samples for stitches – slip basting, slip stitch, running, back, overcasting, hemming, even basting,
9. Preparing samples for seams and seam finishes – Plain seam, double top stitch seam, lapped seam, slot seam, French seam, flat felt seam, pinked finish, edge stitched finish.
10. Preparing samples for Fullness - Darts, Tucks, Pleats, Gathers
11. Preparing samples for Necklines – Bias facing, Bias Binding and Fitted facing
12. Preparing samples for plackets – Continuous Bound Placket, Two Piece Placket, Fly Opening.

**TOTAL: 60 PERIODS**

**COURSE OUTCOMES**

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

- Pattern making of garments
- Develop samples using various stitch classes and seams.
- Develop various garment components.

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

| | |
|---|---|
| Working surface – pattern making / cutting table (polished or laminated top) | – 5 Nos. |
| Rulers – 12" and 36" | – 15 Nos. |
| Tailor's square – 24" x 14" | – 15 Nos. |
| Curve rules – French curves, hip curves and vary form curve | – 15 Nos. |
| Pattern notcher, tracing wheel, awl | – 5 Nos. |
| Measuring tape | – 30 Nos. |
| Pattern weights | – 10 Nos. |
| Dress forms (Full and Half) – Men, Women and children | – 1 set each |
| High speed industrial sewing machines | |
| Single needle lock stitch machine | –15 Nos. |

| Course Outcomes | Statement | Program Outcome | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO11 | PO12 | PSO 1 | PSO 2 | PSO 3 |
| CO1 | To learn how to take basic body measurements and then drafting and grading of basic patterns | 3 | 2 | 3 | 2 | 2 | - | - | - | 2 | - | 2 | 3 | 3 | 3 | 3 |
| CO2 | To learn the different techniques of pattern making and prepare different patterns | 3 | 2 | 3 | 2 | 2 | - | - | - | 2 | - | 2 | 3 | 3 | 3 | 3 |
| CO3 | To understand and learn the draping method and prepare different patterns | 3 | 2 | 3 | 2 | 2 | - | - | - | 2 | - | 2 | 3 | 3 | 3 | 3 |
| CO4 | To learn how to prepare samples for seams and stitches | 3 | 2 | 3 | 2 | 2 | - | - | - | 2 | - | 2 | 3 | 3 | 3 | 3 |
| CO5 | To learn how to prepare samples for fullness, necklines and plackets | 3 | 2 | 3 | 2 | 2 | - | - | - | 2 | - | 2 | 3 | 3 | 3 | 3 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Overall CO** | 3 | 2 | 3 | 2 | 2 | - | - | - | 2 | - | 2 | 3 | 3 | 3 | 3 |

**FT3413 TEXTILE CHEMICAL PROCESSING LABORATORY** **L T P C**
**0 0 3 1.5**

**OBJECTIVES:**

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

**LIST OF EXPERIMENTS**

1. Identification of fibres
2. Analysis of blend composition in the yarn of the fabric
3. Desizing and scouring of cotton fabric.
4. Peroxide Bleaching of Cotton Yarn/Fabric.
5. Degumming of silk.
6. Identification of dyes
7. Dyeing of Cotton using Reactive & Vat dyes.
8. Dyeing of silk yarn / fabric with acid dyes
9. Dyeing of polyester using disperse dyes.
10. Dyeing of polyester and cotton blend
11. Determination of wash, light, perspiration and rubbing fastness of dyed fabrics.
12. Printing of cotton fabric using direct style.
13. Water proof and Flame retardant finishing of cotton.
14. Resin and softener finishes.
15. Analysis and interpretation of spectrophotometer data for dyed fabrics

**TOTAL: 45 PERIODS**

**Course Outcomes**

| | |
|---|---|
| **CO1** | Investigate and identify fibers and dyes |
| **CO2** | Acquiring knowledge on bleaching, dyeing and printing process |
| **CO3** | Estimation and application of chemicals and dyes for processing the textile materials |
| **CO4** | Apply the different types of finishes for the chemical processing |
| **CO5** | Evaluate on fastness properties of dyed materials. |

**LAB EQUIPMENTS**

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS

1. Stainless vats (500 ml) -30 Nos.
2. Water bath -2 Nos.
3. Stirrer -1 No.
4. Steam ager -1 No.
5. Pilot padding mangle -1 No.
6. HTHP Beaker dyeing machine -1 No.
7. Pilot curing chamber -1 No.
8. Fastness tester for Washing, Light, Perspiration & Rubbing -1 No.
9. Printing table -1 No.

| Course Outcomes | Statement | Program Outcome | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PO 1 | PO2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO10 | PO11 | PO12 | PSO 1 | PSO 2 | PSO 3 |
| CO1 | Investigate and identify fibers and dyes | 2 | 1 | 1 | 2 | 3 | - | - | - | 3 | - | - | - | 3 | 1 | 2 |
| CO2 | Acquiring knowledge on bleaching, dyeing and printing process | 2 | 1 | 1 | 2 | 3 | - | - | - | 3 | - | - | - | 2 | 1 | 1 |
| CO3 | Estimation and application of chemicals and dyes for processing the textile materials | 2 | 1 | 1 | 2 | 3 | - | - | - | 3 | - | - | - | 2 | 1 | 1 |
| CO4 | Apply the different types of finishes for the chemical processing | 2 | 1 | 1 | 2 | 3 | - | - | - | 3 | - | - | - | 2 | 1 | 1 |
| CO5 | Evaluate on fastness properties of dyed materials. | 2 | 1 | 2 | 2 | 3 | - | - | - | 3 | - | - | - | 3 | 1 | 1 |
| **Overall CO** | | 2 | 1 | 1 | 2 | 3 | - | - | - | 3 | - | - | - | 2 | 1 | 1 |