Diploma in Handloom & Textile Technology

Curriculum (Semester I & VI)

SEMESTER - I								
S No	Course Category	Course Code	Course Title	Hours/week			Total Hrs/week	Credits
				L	T	P		
1	Basic Science	25BS101	Mathematics-I	2	1	0	3	3
2	Basic Science	25BS105	Applied Chemistry	2	1	0	3	3
3	Humanities & Social Science	25HS101	Communication Skills in English	2	0	0	2	2
4	Engineering Science	25ES101	Engineering Graphics Laboratory	0	0	3	3	1.5
5	Engineering Science	25ES103	Engineering Workshop Laboratory	0	0	3	3	1.5
6	Basic Science	25BS109	Applied Chemistry Laboratory	0	0	2	2	1
7	Humanities & Social Science	25HS103	Sports and Yoga	0	0	2	2	1
8	Humanities & Social Science	25HS105	Communication Skills in English Laboratory	0	0	2	2	1
9	Audit	25AU102	Environmental Science	2	0	0	2	0
				Total			**22**	**14**

SEMESTER - II								
S No	Course Category	Course Code	Course Title	Hours/week			Total Hrs/week	Credits
				L	T	P		
1	Programme core	25HTPC101	Basics of Handloom & Textiles	2	1	0	3	3
2	Basic Science	25BS102	Mathematics-II	2	1	0	3	3
3	Basic Science	25BS103	Applied Physics	2	1	0	3	3
4	Engineering Science	25ES102	Introduction to IT System	3	0	0	3	3
5	Engineering Science	25ES104	Fundamentals of Electrical, Electronics Engineering	2	1	0	3	3
6	Engineering Science	25ES106	Engineering Mechanics	2	1	0	3	3
7	Basic Science	25BS107	Applied Physics Laboratory	0	0	2	2	1
8	Engineering Science	25ES108	Introduction to IT System Laboratory	0	0	2	2	1
9	Engineering Science	25ES110	Fundamentals of Electrical, Electronics Engineering Laboratory	0	0	2	2	1
10	Engineering Science	25ES112	Engineering Mechanics Laboratory	0	0	2	2	1
				Total			**26**	**22**

SEMESTER – III								
S No	Course Category	Course Code	Course Title	Hours/week			Total Hrs/week	Credits
				L	T	P		
1	Programme Core	25HTPC201	Textile Fibres	3	0	0	3	3
2	Programme Core	25HTPC202	Yarn Manufacturing Technology	3	0	0	3	3
3	Programme Core	25HTPC203	Handloom Weaving Technology	3	0	0	3	3
4	Programme Core	25HTPC204	Fabric Structure – I	2	1	0	3	3
5	Programme Core	25HTPC205	Chemical Processing of Textiles - I	3	0	0	3	3
6	Programme Core	25HTPC206	Handloom Weaving Technology Laboratory	0	0	4	4	2
7	Programme Core	25HTPC207	Colour Concept and Textile Design Laboratory	0	0	2	2	1
8	Programme Core	25HTPC208	Chemical Processing of Textiles Laboratory - I	0	0	4	4	2
9	Audit	25AU201	Essence of Indian Knowledge & Tradition	2	0	0	2	0
				Total			**27**	**20**
Bridge Course								
10	Bridge Course	25BS110	Mathematics	2	1	0	3	3
11	Bridge Course	25BS111	Applied Chemistry	2	1	0	3	3
12	Bridge Course	25BS112	Applied Physics	2	1	0	3	3
SEMESTER – IV								
S No	Course Category	Course Code	Course Title	Hours/week			Total Hrs/week	Credits
				L	T	P		
1	Programme Core	25HTPC209	Weaving Technology - I	3	0	0	3	3
2	Programme Core	25HTPC210	Fabric Structure – II	2	1	0	3	3
3	Programme Core	25HTPC211	Chemical Processing of Textiles -II	3	0	0	3	3
4	Programme Core	25HTPC212	Fibre & Yarn Quality Evaluations	3	0	0	3	3
5	Programme Elective	25HTPE2**	Programme Elective - I	3	0	0	3	3
6	Programme Core	25HTPC213	Fabric Analysis & Costing Laboratory - I	0	0	2	2	1
7	Programme Core	25HTPC214	Weaving Technology Laboratory	0	0	4	4	2
8	Programme Core	25HTPC215	Chemical Processing of Textiles Laboratory – II	0	0	4	4	2
9	Programme Core	25HTPC216	Fibre & Yarn Quality Evaluation Laboratory	0	0	3	3	1.5
10	Internship	25IS201	Internship-I/ Educational Tour	0	0	0	0	2
11	Audit	25AU202	Indian Constitution	2	0	0	2	0
				Total			**30**	**23.5**

SEMESTER - V								
S No	Course Category	Course Code	Course Title	Hours/week			Total Hrs/week	Credits
				L	T	P		
1	Programme Core	25HTPC301	Weaving Technology - II	3	0	0	3	3
2	Programme Core	25HTPC302	Garment Manufacturing Technology	3	0	0	3	3
3	Programme Core	25HTPC303	Fabric & Garment Quality Evaluation	3	0	0	3	3
4	Programme Core	25HTPC304	Advances in Textile Processing	3	0	0	3	3
5	Programme Elective	25HTPE3**	Programme Elective - II	3	0	0	3	3
6	Programme Core	25HTPC305	Jacquard Weaving & Computer Aided Textile Designing Laboratory	0	0	4	4	2
7	Programme Core	25HTPC306	Fabric & Garment Quality Evaluation Laboratory	0	0	3	3	1.5
8	Programme Core	25HTPC307	Garment Manufacturing Technology Laboratory	0	0	4	4	2
9	Projects	25PR301	Mini Project	0	0	4	4	2
10	Internship	25IS301	Internship – II	0	0	0	0	3
11	Audit	25AU301	Soft Skills & Personality Development	2	0	0	2	0
				Total			**32**	**25.5**

SEMESTER - VI								
S No	Course Category	Course Code	Course Title	Hours/week			Total Hrs/week	Credits
				L	T	P		
1	Programme Core	25HTPC308	Advanced Fabric Structures	3	0	0	3	3
2	Programme Core	25HTPC309	Technical Textiles	3	0	0	3	3
3	Humanities & Social Science	25HS301	Entrepreneurship and Start-ups	3	0	0	3	3
4	Programme Elective	25HTPE3**	Programme Elective - III	3	0	0	3	3
5	Programme Core	25HTPC310	Fabric Analysis & Costing Laboratory - II	0	0	2	2	1
6	Humanities & Social Science	25HS302	Seminar	0	0	3	3	1.5
7	Projects	25PR302	Major Project	0	0	8	8	4
				Total			**25**	**18.5**

S.No	Semester-IV		Semester-V		Semester-VI	
	Programme Elective-I		Programme Elective-II		Programme Elective -III	
	Course Code	Course Title	Course Code	Course Title	Course Code	Course Title
1	25HTPE201	Traditional Handloom Textiles of India	25HTPE301	Advances in Spinning Systems	25HTPE304	Apparel Marketing and Merchandising
2	25HTPE202	Technological Developments in Handlooms	25HTPE302	Knitting Technology	25HTPE305	Fashion Designing
3	25HTPE203	Handcrafted Textile & Handloom Tourism of India	25HTPE303	Nonwoven Technology	25HTPE306	Home Textiles

Detailed Overall Credits allotment for (R- 25):

Course Category	Course Code	Sem - I	Sem - II	Sem - III	Sem - IV	Sem - V	Sem - VI	Total
Humanities and Social Sciences	HS	4					4.5	**8.5**
Basic Sciences	BS	7	7					**14**
Engineering Science	ES	3	12					**15**
Programme Core	HTPC		3	20	18.5	17.5	7	**66**
Programme Elective	HTPE				3	3	3	**9**
Internship - I	IS2				2			**2**
Internship - Il	IS3					3		**3**
Mine Project	PR2					2		**2**
Major Project	PR3						4	**4**
Audit Course	AU	0		0	0			**0**
Overall Credit		**14**	**22**	**20**	**23.5**	**25.5**	**18.5**	**123.5**

DETAILS OF CREDIT DISTRIBUTION

Course Category	Course Code	Credit required as per AICTE Norms	Credit allotted (R- 2021)	Credit allotted (R- 2025)
Humanities and Social Sciences	HS	8	9.5	8.5
Basic Sciences	BS	19	15	14
Engineering Science	ES	15	15	15
Programme Core	HTPC	45-50	52	66
Programme Elective	HTPE	12-16	12	9
Summer Internship - I	IS2	2	2	2
Summer Internship - Il	IS3	3	3	3
Minor Project	PR2	2	2	2
Major Project	PR3	4	4	4
Audit Course	AU	0	0	0
Overall Credit		**119**	**120.5**	**123.5**

Internship-I / Educational Tour (2-3 weeks) **2 Credits**

The internship with course code 25IS201 pertains to the 4th semester. Students shall be undertaken the Educational tour not less than 15 days or 3 weeks of internship during the winter vacation at the end of 3rd semester. After completing this internship/educational tour, the students shall submit the report during the 4th semester assessment. If Student selected the internship, he/she shall be undertake the internship in an industry/Govt. or Pvt. Certified Agencies which are in Social sector/ Govt. Skill Centres/Institutes/Schemes.

Internship –II (4-6 weeks) **3 Credits**

The internship with course code 25IS301 pertains to the 5th semester. This shall be undertaken during the summer vacation at the end of 4th semester. After completing the internship, the students shall submit the report to the faculty during the 5th semester for assessment. This shall be undertaken in a handloom or textile industry only.

Mini Project **2 Credits**

The Mini project groups be formed before the 4th semester summer vacation period. During the Mini Project period students may finalize the Title, Objectives, Scope and Research Methodology and start the preliminary work (based on real/ live problems of the industry/Govt./NGO/MSME/Rural sector or an innovative idea having the potential of a Start-up) for the Major Project and the students shall submit the mini project report during the 5th semester for assessment / vivo-voice.

Major Project **4 Credits**

In continuation with the Mini Project students may innovate or develop a product or sample to fulfil the Major Project in the 6th semester.

Diploma in Handloom & Textile Technology

Curriculum & Syllabus (Semester I)

S No	Course Category	Course Code	Course Title	Hours / week			Total Hrs / week	Credits
				L	T	P		
1	Basic Science	25BS101	Mathematics-I	2	1	0	3	3
2	Basic Science	25BS105	Applied Chemistry	2	1	0	3	3
3	Humanities & Social Science	25HS101	Communication Skills in English	2	0	0	2	2
4	Engineering Science	25ES101	Engineering Graphics Laboratory	0	0	3	3	1.5
5	Engineering Science	25ES103	Engineering Workshop Laboratory	0	0	3	3	1.5
6	Basic Science	25BS109	Applied Chemistry Laboratory	0	0	2	2	1
7	Humanities & Social Science	25HS103	Sports and Yoga	0	0	2	2	1
8	Humanities & Social Science	25HS105	Communication Skills in English Laboratory	0	0	2	2	1
9	Audit	25AU102	Environmental Science	2	0	0	2	0
				Total			**22**	**14**

Course Title	: **MATHEMATICS-I**					**Semester –I**
Course Code	: **25BS101**	**L**	**T**	**P**	**C**	
Course Category	: **BASIC SCIENCE**	2	1	0	3	

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Apply trigonometric concepts to perform geometric calculations and solve real-life mathematical problems.

CO2 Explain the role of algebra as a foundational tool in solving mathematical problems.

CO3 Explain the geometric and analytical meanings of limits, continuity, and differentiability.

CO4 Apply binomial theorem to simplify complex problems.

CO5 Apply the concept of probability and statistics in solving real life problems.

Unit-I Trigonometry **10 Hours**

Concept of angles, triangles (especially right angular triangle), measurement of angles in degrees and radians and their conversions. Pythagoras Theorem (without proof) and it's applications (some examples). Trigonometric ratios: trigonometric ratios of some special angles (0°, 30°, 45°, 60°, 90°). Trigonometric identities: Compound angle identities- $(A \pm B)$, $co(A \pm B)$, $tan(A \pm B)$ (without proof), double angle identities – $sin2A$, $cos2A$, $tan2A$, simple problems.

Unit-II Algebra–I **8 Hours**

Complex numbers: Introduction to i ($\sqrt{-1}$), definition of complex numbers, real and

imaginary parts of complex numbers, Cartesian and polar representation of complex numbers, conjugate of complex numbers, modulus and amplitude of complex numbers. Addition, Subtraction, Multiplication, Division of complex numbers.

Unit-III Differential Calculas **10 Hours**

Concept of function and their graphical representation (especially $sinx$, $cosx$,$\frac{1}{x}$,). Concept of limit and continuity. Some standard limits and their applications. Concept of differentiability, Differentiation of standard functions xn,, $cosx$, $tanx$, $secx$, $cosecx$,$cotx$, ex, $logx$, $\sqrt{x}$, $\frac{1}{x}$. Differentiation of sum, product & quotient of functions. Differentiation of composition of functions (chain rule).

Unit-IV Permutation, Combination &Binomial Theorem **7 Hours**

Concept and use of permutation & combination. Value of $nCr$and nPr. Simple problems. Binomial theorem: Binomial theorem (without proof) for positive integral index (expansion and general form), finding 'r' th term, middle term(s), coefficient of 'xr' of expansion, x free term. Binomial theorem for any index (expansion without proof) first and second binomial approximation with applications to engineering problems.

Unit-V Probability and Statistics **10 Hours**

Random experiment, outcomes, sample space, events, occurrence of events, exhaustive events, mutually exclusive events, 'or', 'and', and 'not' events, independent events. Classical definition of probability, axioms of probability, probability of an event, probability of exhaustive events, mutually exclusive events, 'or', 'and', and 'not' events, independent events.

Statistical data, ungrouped data, grouped data, discrete data, arithmetic mean (direct method only), median, mode.

Total **45 Hours**

Text books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 40thEdition, 2007.
2. G. B. Thomas, R. L. Finney, Calculus and Analytic Geometry, Addison Wesley, 9th Edition,1995.
3. Reena Garg, Engineering Mathematics, Khanna Publishing House, New Delhi (Revised Ed2018).
4. Mathematics NCERT Textbook for Class XI, 2024-25 Edition.
5. Mathematics NCERT Textbook for Class XII part I, 2024-25 Edition.
6. Mathematics NCERT Textbook for Class XII part II, 2024-25 Edition.

References:

1. Sundaram, R. Balasubramanian, K. A. Lakshminarayanan, Engineering Mathematics, 6/e., Vi-kas Publishing House.
2. Bartle R.G., Sherbert D.R. Introduction to real analysis (3rd edition)
3. K. Hoffman and R. Kunze: Linear Algebra.
4. H. S. Kasana: Complex Variables – Theory and Applications.
5. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.

Course Title	:	**APPLIED CHEMISTRY**				**Semester –I**
Course Code	:	**25BS105**	**L**	**T**	**P**	**C**
Course Category	:	**BASIC SCIENCE**	2	1	0	3

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Explain the general properties of Atom & molecules, water along with its solutions.

CO2 Describe the suitability of oxidizing and reducing agent for domestic and industrial application.

CO3 Explain the principles of electrochemical cells, electrode potentials, and oxidation-reduction processes.

CO4 Define organic compounds and polymers suitable for economical industrial processing to obtain Eco-friendly finished products.

Samrat

CO5 Describe states of matter chemical kinetics and economical techniques of reaction mechanism.

Unit-I Atomic structure, Water & Solution 9 Hours

Bohr model of atom, Quantum numbers, Aufbau principal, Pauli's Exclusion principle, Hund's rule of maximum multiplicity, Electronic configuration of elements, Definition of Atomic number, Mass number, Isotopes, Isotones and Isobars, Concept of hybridization SP2, SP3, SP and Shape of molecules.

Classification Soft and Hard water, Salt causing hardness, Unit of hardness, Action of soap on water, Types of Hardness, Causes of hardness, Disadvantages of using hard water, Estimation of total hardness by EDTA method, Removal of hardness by Permutit process, Ion-exchange process and Calgon treatment, TDS.

Introduction of solution, Solvent & Solute. Types of solutions. Method to express concentration of solution- Molarity, Normality, Mass percentage (W/W), Volume Percentage (V/V), Mass by Volume percentage (W/V), Standard solution- primary and secondary standards.

Unit-II Acid, Base and Salt & Chemical Bonding 9 Hours

Arrhenius Theory & Lewis theory on Acidity, Basicity & Salts; Avogadro number, Concept of strong & weak acids, Study on Hydrochloric Acid, Acetic Acid, Sulphuric Acid, Concept of Strong & weak bases, Mole concept, Acidity, Basicity, Neutralization reaction, Hydrolysis of Salts, Equivalent Weight of acids, bases & salts; concept of pH and pH scale; choice of Indicator.

Concept of atom and molecule, cause of Chemical Bond, Types of Bonds: Ionic Bond, Covalent Bond & Co-ordinate Bond with example. Hydrogen Bonding in HF, water, and ice; Vander Waal's Force, Adhesive Force & Cohesive Force.

Unit-III Electrochemistry & Oxidation-Reduction 9 Hours

Oxidation and Reduction by Electronic concept, Balancing chemical equations by Ion- electron method, Electrolysis, Arrhenius theory, Faraday's Laws, Electrolysis of CuSO4 solution using Pt-electrode and Cu-electrode. Application of electrolysis such as Electroplating, Electro-refining and Electrotyping; Electrochemical Cells, Primary Cell -Dry Cell, Secondary Cell -Lead storage cell, Electrochemical series. Types of Oxidizing & Reducing agent, Types of Binder & their application, Study on I) Caustic Soda II) Sodium Chloride III) Bleaching Powder IV) Hydrogen Peroxide

Unit-IV Basic of Organic Chemistry & Polymer Chemistry 9 Hours

Organic compounds, Classification, Tetra Valence Of Carbons, Homologous series, Functional groups, Isomerism, IUPAC nomenclature ,Properties and preparation of Methane, Ethylene and Acetylene (Simple Alkane , Alkene & Alkynes); Study on - Aromatic Compounds (Benzene & its Derivative Naphthalene and phenol).

Concept of Monomer, Polymers , Homo polymer, Co-polymer, classification of Polymers, Study on - PVC, PTFE, PS, TEFLON ; Study on Synthetic Fibre - PAN, NYLON-6 , NYLON-66, TERELYENE; Biodegradable and Non-biodegradable Polymers.

Unit-V States of Matter & Chemical Kinetics **9 Hours**

Three states of matter, Concept of Latent Heat, Inter Molecular Forces, Introduction Of Solid state, Classification of solids – crystalline and amorphous, Relationship between structure and properties of crystalline solids namely ionic solid, covalent solid and molecular solids. Covalent bonds in Carbon.

Reversible and Irreversible reactions, Exothermic and Endothermic Reactions, Chemical equilibrium, Le Chatelier's Industrial preparation of Ammonia by Haber's Process, Nitric acid by Ostwald's process and Sulphuric Acid by Contact Process; Catalyst and Catalysis, Rate of Reactions, Graphical Study on Reactant and Product, limiting Reagent.

Total **45 Hours**

Text books:

1. Text Book of Chemistry for Class XI & XII (Part-I, Part-II); N.C.E.R.T., Delhi, 2022
2. ISC Chemistry, K.L Chugh, Kalyani Publishers, Ludhiaana, 2022
3. ISC Chemistry,Dr H.C Srivastava, Nageen Prakashan Pvt Ltd, Meerut- 250002, UP. 2020
4. Dara,S.S & Dr.S.S.Umare, Engineering Chemistry,S. Chand. Publication, New Delhi, 2020.
5. Jain & Jain, Engineering Chemistry, Dhanpat Rai and Sons; New Delhi, 2020.

References:

1. All in one Chemistry for class XI & XII, Arihant Pvt Ltd,2022
2. CBSC Chemistry For class XI & XII, Allen Pvt Ltd, 2024
3. Maiti, Tewar & Roy, Chemistry for XI & XII, Chhaya Prakashani Pvt.Ltd.,2024

Course Title	:	**COMMUNICATION SKILLS IN ENGLISH**				**Semester –I**
Course Code	:	**25HS101**	**L**	**T**	**P**	**C**
Course Category	:	**HUMANITIES & SOCIAL SCIENCE**	2	0	0	2

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1	Develop basic speaking and writing skills including proper usage of language and vocabulary so that they can become highly confident and skilled speakers and writers.
CO2	Communicate effectively in presentations, interviews and other forms of oral Communication.
CO3	Draft emails and letters professionally.
CO4	Develop non-verbal communication such as proper use of body language and gestures.
CO5	Develop skills and confidence to communicate effectively in presentation, interviews and other forms of oral communication.

Unit-I Communication: Theory and Practice **6 Hours**

Basics of communication: Introduction, meaning and definition, process of communication. Types of communication: Formal and informal, verbal and non-verbal and written. Barriers to effective communication, 7 Cs for effective communication (considerate, concrete, concise, clear complete, correct, courteous), Art of Effective communication (choosing words, voice modulation, clarity, time, simplification of words, technical communication).

Unit-II Soft Skills for Professional Excellence **6 Hours**

Introduction to Soft Skills and Hard Skills, Importance of Soft Skills. Life Skills: Self- awareness and self-analysis, adaptability, resilience, emotional intelligence and empathy etc. Applying soft-skills across cultures.

Unit-III Reading Comprehension **6 Hours**

Comprehension, vocabulary enhancement and grammar exercises based on reading of the following texts: Section 1-The Blue Umbrella: Ruskin Bond, Jimmy Valentine: O. Henry, My Lost Dollar: Stephen Leacock, Nobel Lecture: Mother Teresa, Engine Trouble: R. K Narayan.

Section 2-Shall I compare thee to a summer's day (Sonnet no.18): William Shakespeare, Stopping by woods on a Snowy Evening: Robert Frost, Where the Mind is Without Fear: Rabindranath Tagore, The Night of the Scorpion: Nissim Ezekiel, The cold within: James Patrick Kinney.

Unit-IV Professional Writing **6 Hours**

Précis writing, Letter writing (Personal and Business), E-mail, Notice, Minutes of a meeting, Filling-up various forms.

Unit-V Structure, Vocabulary and Grammar **6 Hours**

The structure of English Language (System of English Speech Sounds, Structure of Words, Sentence Structure, Discourse Structure). Grammar: Articles, Prepositions, Tenses, Voice, Direct-Indirect Speech, Transformation of sentences.

Total **30 Hours**

Text books:

1. J.D.O'Connor. Better English Pronunciation. Cambridge: Cambridge University Press, 1980.
2. Lindley Murray, An English Grammar: Comprehending Principles and Rules. London: Wilson and Sons, 1908.
3. Kulbhushan Kumar, Effective Communication Skills, Khanna Publishing House, New Delhi (Revised Edition 2018)
4. Basudeb Chakraborti & others, Enrich 1, Cambridge University Press, 2023
5. Ruskin Bond, The Blue Umbrella, Red Turtle, 2013.

References:

1. Margaret M. Maison. Examine your English. Orient Longman: New Delhi, 1964.

2. M. Ashraf Rizvi. Effective Technical Communication. Mc-Graw Hill: Delhi, 2002.
3. John Nielson. Effective Communication Skills. Xlibris, 2008.
4. Oxford Dictionary
5. Roget's Thesaurus of English Words and Phrases
6. Collin's English Dictionary

Course Title	:	**ENGINEERING GRAPHICS LABORATORY**				**Semester –I**
Course Code	:	**25ES101**	**L**	**T**	**P**	**C**
Course Category	:	**ENGINEERING SCIENCE**	0	0	3	1.5

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Select and construct appropriate drawing scales, use drawing equipment's, and understand Indian Standards of engineering drawing.

CO2 Draw views of given object and components.

CO3 Sketch orthographic projections into isometric projections and vice versa.

CO4 Sketch Isometric projection.

CO5 Apply computer aided drafting tools to create 2D engineering drawings.

Unit-I Basic Elements of Drawing **6 Hours**

Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering Different types of lines and their use; Plain scale, Diagonal scale.

Unit-II Geometrical construction and curves **6 Hours**

Construction of polygons, Conic sections including the Ellipse (Oblong and Concentric circle method), Parabola (Oblong and Tangent Method), Rectangular Hyperbola (General method only).

Unit-III Projection of Points, Lines, Surfaces **12 Hours**

Projection and its classifications; Principles of Orthographic Projections-Conventions - 1st and 3rd angle projection, Projections of Points and lines inclined to both planes; Projections of planes (Rectangle, pentagon, Hexagon, Circle etc.) inclined Planes - Auxiliary Planes.

Unit-IV Orthographic Projection **9 Hours**

Conversion of pictorial view into Orthographic Views – object containing plain surfaces, slanting surfaces, slots, ribs, cylindrical surfaces. (use First Angle Projection method only).

Unit-V Isometric Projections **12 Hours**

Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions.

Total **45 Hours**

Text books:

1. Pradeep Jain, Ankita Maheswari, A.P. Gautam, Engineering Graphics & Design, Khanna Publishing House.
2. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House.
3. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH.
4. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education.
5. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers.
6. Corresponding set of CAD Software Theory and User Manuals.

Course Title	:	**ENGINEERING WORKSHOP LABORATORY**				**Semester –I**
Course Code	:	**25ES103**	**L**	**T**	**P**	**C**
Course Category	:	**ENGINEERING SCIENCE**	0	0	3	1.5

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Acquire skills in basic engineering practice to identify, select and use various marking, measuring, and holding, striking and cutting tools & equipment's and machines.

CO2 Interpret job drawing and complete jobs as per specifications in allotted time.

CO3 Explain the functions, applications, and safety aspects of various wiring systems used in domestic installations.

Unit-I Carpentry **9 Hours**

1. Demonstration of different wood working tools / machines.
2. Demonstration of different wood working processes, like plaining, marking, chiseling, grooving, turning of wood etc.
3. One simple job involving any one joint like mortise and tenon dovetail, bridle, half lap etc.

Unit-II Fitting **9 Hours**

1. Demonstration of different fitting tools and drilling machines and power tools.
2. Demonstration of different operations like chipping, filing, drilling, tapping, sawing, cutting etc.
3. One simple fitting job involving practice of chipping, filing, drilling, tapping, cutting etc.

Unit-III Sheet metal working **9 Hours**

1. Demonstration of different sheet metal tools / machines.
2. Demonstration of different sheet metal operations like sheet cutting, bending, edging, end curling, lancing, soldering, brazing, and riveting.

3. One simple job involving sheet metal operations and soldering and riveting.

Unit-IV Welding **9 Hours**

1. Demonstration of different welding tools / machines.
2. Demonstration on Arc Welding, Gas Welding, MIG, TIG welding, gas cutting and rebuilding of broken parts with welding.
3. 3.One simple job involving butt and lap joint by Gas welding and SMAW.

Unit-V Electrical house wiring **9 Hours**

Practice on simple lamp circuits:

1. One lamp controlled by one switch by surface conduit wiring
2. Lamp circuits- connection of lamp and socket by separate switches
3. Connection of Fluorescent lamp/tube light
4. Simple lamp circuits-install bedroom lighting
5. 5.Simple soldering exercises to be executed to understand the basic process of soldering.

Total **45 Hours**

Course Title	:	**APPLIED CHEMISTRY LABORATORY**				**Semester –I**
Course Code	:	**25BS109**	**L**	**T**	**P**	**C**
Course Category	:	**BASIC SCIENCE**	0	0	2	1

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Explain different methods of quantitative analysis and describe quantitative analysis of water sample.

CO2 Identify different organic sample used in developing dyes and recipes and find out methods to determine percentage of food stuffs in food samples commercially.

CO3 Determine pH for organic, inorganic samples that helps in domestically as well as commercially used.

List of Experiments **30 Hours**

1. To determine the concentration/Molarity of given $KMnO_4$ titrating against standard solution of Oxalic Acid.
2. Volumetric estimation of total hardness of given water sample using standard EDTA solution.
3. Determine the TDS of given water sample.
4. Determination of strength of given solution of HCl or $H2SO_4$ with standard Sodium Carbonate solution.

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5. Check the pH of solutions of Sodium Carbonate (0.1 M), Sodium Hydroxide (0.1M), potassium hydroxide (0.1M), Ferric Chloride (0.1M), Oxalic Acid (0.1M), Hydrochloric Acid and Acetic Acid.
6. Test for functional group present in organic compounds- unsaturation, Alcoholic OH, Phenolic OH, Aldehyde, Carboxylic Acid, Amine.

Perform qualitative analysis to find out the presence of cations and anions in a given water soluble salt. The following ions need to be determined:

7. Cation: Lead, Copper, Aluminium, Arsenic
8. Anions: Carbonate, Nitrate, Sulphate, Chloride.
9. Characteristic test for Carbohydrate, Fat and Proteins in given samples.
10. Find the variation of cell potential in Zn | Zn2+ | | Cu2+ | Cu with change in Concentration of Electrolytes ($CuSO_4$ or $ZnSO_4$) at room temperature.
11. Determine Viscosity by Ostwald's Viscometer.
12. Neutralization reaction of NaOH vs $C_2H_2O_4$.
13. Estimate the strength of Hydrogen Peroxide.
14. Estimate the Available Chlorine present in given bleaching solution.

Note: Minimum 10 experiments to be performed.

Total **30 Hours**

Text books:

1. Text book of Chemistry for Class XI & XII (Part-I, Part-II); N.C.E.R.T., Delhi.
2. Dr. G. H. Hugarand, Prof A. Pathak, Applied Chemistry Laboratory Practices, Vol. I and Vol. II, NITTTR, Chandigarh, Publications, 2013-14.
3. Agnihotri, Rajesh, Chemistry for Engineers, Wiley India Pvt.Ltd.,2014.

Course Title	:	**SPORTS AND YOGA**				**Semester –I**
Course Code	:	**25HS103**	**L**	**T**	**P**	**C**
Course Category	:	**HUMANITIES & SOCIAL SCIENCE**	0	0	2	1

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Practice Physical activities and Hatha Yoga focusing on yoga for strength, flexibility, and relaxation.

CO2 Learn breathing exercises and healthy fitness activities

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CO3	Explain the importance and benefits of basic yoga practices and physical activities for enhancing strength, flexibility, balance, and coordination.
CO4	Identify opportunities for participation in yoga and sports activities.
CO5	Identify and apply injury prevention principles related to yoga and physical fitness activities and correctly apply biomechanical and physiological principles elated to exercise and training.

Unit-I Introduction to Physical Education

Meaning & definition of Physical Education, Aims & Objectives of Physical Education, Changing trends in Physical Education.

Unit-II Physical Fitness, Wellness & Lifestyle

Meaning & Importance of Physical Fitness & Wellness, Components of Physical fitness, Components of Health related fitness, Components of wellness, Preventing Health Threats through Lifestyle Change, Concept of Positive Lifestyle.

Unit-III Fundamentals of Anatomy & Physiology in Physical Education, Sports and Yoga

Define Anatomy, Physiology & Its Importance, Effect of exercise on the functioning of Various Body Systems. (Circulatory System, Respiratory System, Neuro-Muscular System etc.)

Unit-IV Yoga

Meaning & Importance of Yoga, Elements of Yoga, Introduction - Asanas, Pranayama, Meditation & Yogic Kriyas, Yoga for concentration & related Asanas (Sukhasana; Tadasana; Padmasana & Shashankasana) Relaxation Techniques for improving concentration - Yog- nidra.

Unit-V Sports Medicine

First Aid – Definition, Aims & Objectives. Sports injuries: Classification, Causes & Prevention. Management of Injuries: Soft Tissue Injuries and Bone & Joint Injuries.

Total 30 Hours

References:

1. Modern Trends and Physical Education by Prof. Ajmer Singh.
2. Light on Yoga By B.K.S. Iyengar.
3. Health and Physical Education – NCERT (11th and 12th Classes).

Course Title	:	**COMMUNICATION SKILLS IN ENGLISH LABORATORY**				**Semester –I**
Course Code	:	**25HS105**	**L**	**T**	**P**	**C**
Course Category	:	**HUMANITIES & SOCIAL SCIENCE**	0	0	2	1

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Apply language skills to read, write, and speak English in common social and workplace situations.

CO2 Demonstrate comprehension of spoken English by listening carefully and interpreting others' viewpoints respectfully.

CO3 Identify key elements of effective listening such as attention, comprehension, and response.

Unit-I Listening Skills **7 Hours**

Listening Process and Practice: Introduction to recorded lectures, poems, interviews and speeches, listening tests.

Unit-II Introductions to Phonetics **8 Hours**

Sounds: consonant, vowel, diphthongs etc. Transcription of words (IPA), weak forms. Syllable division, word stress, intonation, voice etc.

Unit-III Speaking Skills **7 Hours**

Standard and formal speech: Group discussion, oral presentations, public speaking, business presentations etc. Conversation practice and role playing, mock interviews etc.

Unit-IV Building Vocabulary **8 Hours**

Construction of words, phrasal verbs, foreign phrases, Etymological study of words idioms and phrases. Jargon/ Register related to organizational set up, word exercises and word games to enhance self-expression and vocabulary of participants.

Total **30 Hours**

Text books:

1. Daniel Jones. The Pronunciation of English. Cambridge: Cambridge University Press 1956.
2. James Hartman & etal. Ed. English Pronouncing Dictionary. Cambridge University Press, 2006.
3. Kulbhushan Kamar. Effective Communication Skills, Khanna Publishing House. New Delhi (Revised Ed. 2018).

References:

1. J.D.O'Connor, Better English Pronunciation. Cambridge: Cambridge University Press, 1980.
2. Lindley Murray, An English Grammar: Comprehending Principles and Rules,London: Wilson and Sons, 1908.
3. Margaret M. Maison. Examine your English. Orient Longman: New Delhi: 1964.
4. J.Sethi& et al. A Practical Course in English Pronunciation. New Delhi: PrenticeHall, 2004.

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5. Pfeiffer. William Sanborn and TVS Padmaja. Technical Communication A Practical
6. Approach, 6th ed. Delhi: Pearson 2007.

Course Title	: **ENVIRONMENTAL SCIENCE**					**Semester –I**
Course Code	: **25AU102**	**L**	**T**	**P**	**C**	
Course Category	: **AUDIT**	2	0	0	0	

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1	Solve various engineering problems applying ecosystem to produce eco–friendly products.
CO2	Explain the principles and working of common air and noise pollution control methods to solve domestic and industrial problems
CO3	Explain the principles and working of common water and soil control method to solve domestic and industrial problems.
CO4	Describe the characteristics, advantages, and limitations of various energy sources for different applications for domestic and industrial applications.
CO5	Solve local solid and e-waste problems.

Unit-I Eco System **4 Hours**

Structure of ecosystem, Biotic & Abiotic components Food chain and food web. Aquatic (Lentic and Lotic) and terrestrial ecosystem. Carbon, Nitrogen, Sulphur, Phosphorus cycle. Global warming -Causes, effects, process, Green House Effect, Ozone depletion.

Unit-II Air and Noise Pollution **5 Hours**

Definition of pollution and pollutant, Natural and manmade sources of air pollution (Refrigerants, I.C., Boiler) Air Pollutants: Types, Particulate Pollutants: Effects and control (Bag filter, Cyclone separator, Electrostatic Precipitator) Gaseous Pollution Control: Absorber, Catalytic Converter, Effects of air pollution due to Refrigerants, I.C., Boiler Noise pollution: sources of pollution, measurement of pollution level, Effects of Noise pollution, Noise pollution (Regulation and Control) Rules, 2000.

Unit-III Water and Soil Pollution **5 Hours**

Sources of water pollution, Types of water pollutants, Characteristics of water pollutants, Turbidity, pH, total suspended solids, total solids BOD and COD: Definition, calculation Waste Water Treatment: Primary methods: sedimentation, froth floatation, Secondary methods: Activated sludge treatment, Trickling filter, Bioreactor, Tertiary Method: Membr0ane separation technology, RO (reverse osmosis). Causes, Effects and Preventive measures of Soil Pollution: Causes-Excessive use of Fertilizers, Pesticides and Insecticides, Irrigation, E-Waste.

Unit-IV Renewable Sources of Energy **8 Hours**

Solar Energy: Basics of Solar energy, Flat plate collector (Liquid & Air). Theory of flat plate collector, Importance of coating, Advanced collector: Solar pond, Solar water heater, solar dryer, Solar stills. Biomass: Overview of biomass as energy source, Thermal characteristics of biomass as fuel, Anaerobic digestion. Biogas production mechanism. Utilization and storage of biogas. Wind energy: Current status and future prospects of wind energy, Wind energy in India, Environmental benefits and problem of wind energy. 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-V Solid Waste Management, ISO 14000 & Environmental Management **8 Hours**

Solid waste generation- Sources and characteristics of Municipal solid waste, E- waste, biomedical waste. Metallic wastes and Non-Metallic wastes (lubricants, plastics, rubber) from industries. Collection and disposal: MSW (3R principles, energy recovery, sanitary landfill), Hazardous waste Air quality act 2004, air pollution control act 1981 and water pollution and control act1996. Structure and role of Central and state pollution control board. Concept of Carbon Credit, Carbon Footprint. Environmental management in fabrication industry. ISO14000: Implementation in industries, Benefits

Total **30 Hours**

Text books:

1. S.C. Sharma & M.P. Poonia, Environmental Studies, Khanna Publishing House, New Delhi.
2. C.N. R. Rao, Understanding Chemistry, Universities Press (India) Pvt. Ltd., 2011.
3. Arceivala, Soli Asolekar, Shyam, Waste Water Treatment for Pollution Control and Reuse, Mc-Graw Hill Education India Pvt. Ltd., New York, 2007, ISBN:978-07- 062099.
4. Nazaroff, William, Cohen, Lisa, Environmental Engineering Science, Willy, New York, 2000, ISBN 10: 0471144940.

References:

1. O.P. Gupta, Elements of Environmental Pollution Control, Khanna Publishing House, New Delhi.
2. Rao, C. S., Environmental Pollution Control and Engineering, New Age International Publication.

Diploma in Handloom & Textile Technology

Curriculum & Syllabus (Semester II)

S No	Course Category	Course Code	Course Title	Hours / week			Total Hrs / week	Credits
				L	T	P		
1	Programme core	25HTPC101	Basics of Handloom & Textiles	2	1	0	3	3
2	Basic Science	25BS102	Mathematics-II	2	1	0	3	3
3	Basic Science	25BS103	Applied Physics	2	1	0	3	3
4	Engineering Science	25ES102	Introduction to IT System	3	0	0	3	3
5	Engineering Science	25ES104	Fundamentals of Electrical, Electronics Engineering	2	1	0	3	3
6	Engineering Science	25ES106	Engineering Mechanics	2	1	0	3	3
7	Basic Science	25BS107	Applied Physics Laboratory	0	0	2	2	1
8	Engineering Science	25ES108	Introduction to IT System Laboratory	0	0	2	2	1
9	Engineering Science	25ES110	Fundamentals of Electrical, Electronics Engineering Laboratory	0	0	2	2	1
10	Engineering Science	25ES112	Engineering Mechanics Laboratory	0	0	2	2	1
				Total			**26**	**22**

Course Title	:	**BASICS OF HANDLOOM & TEXTILES**				**Semester –II**
Course Code	:	**25HTPC101**	**L**	**T**	**P**	**C**
Course Category	:	**PROGRAMME CORE**	2	1	0	3

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Identify and classify various natural, regenerated, and synthetic fibres based on structure, properties, and identification tests.

CO2 Explain yarn formation principles, spinning sequences, yarn types, twist parameters, and count systems.

CO3 Describe preparatory weaving processes, loom classifications, loom motions, and shedding mechanisms.

CO4 Construct and interpret basic woven structures, draft plans, peg plans, and identify causes of fabric defects.

CO5 Explain textile pre-treatments, dyeing mechanisms, printing, and finishing processes.

Unit-I Textile Fibres **9 Hours**

Introduction: Terminologies related to fibres – staple fibre, filament, spun yarn, multi- filaments, mono filament, flat & textured, tow, LOY, POY, FDY, Dope dyed fibres. Classification of textile fibres; Essential and desirable properties of textile fibres; Chemical compositions of Cotton, Silk & Wool. Microscopic view and Fibre identification by burning & chemical test of Cotton, Jute, Linen, Silk, Wool, Viscose-rayon, Polyester, Nylon & Acrylic; Principle of Melt spinning, Wet spinning & Dry Spinning.

Unit-II Yarn Spinning **9 Hours**

Objective of ginning; Principle of yarn formation; Types of spun yarn spinning; Sequences of ring yarn (carded & combed) production; objectives of blowroom, carding, combing, drawframe, rovingframe, ringframe and OE Spinning. Types of yarns – carded, combed, single, folded/ply, , cabled, slub, blended, compact, Core spun, elastic, fancy & metalic yarns; Twist – Directions, TPI, TPM, TM & TF; types of yarn packages – hank, cone, cheese, bobbin & spools. Definition and formula for Yarn count - Indirect system (Ne, Nf), Direct System (Denier) & Universal System (Tex).

Unit-III Handloom & Weaving **9 Hours**

Introduction to winding, warping, sizing & weaving. Definition & Classification of looms- Handloom, Powerloom, automatic loom, unconventional loom, circular loom. Passage of warp & parts of handloom; Motions – Primary, Secondary & Auxiliary.

Unit-IV Fabric Structure **9 Hours**

Classification and Principle of Woven, Knitted, Nonwoven and Braided. Woven fabric fundamental aspects; Count of graph paper & method of design representation on graph paper; Principle of design, draft, peg-plan / lifting & tie-up plans for Plain, 2/2 Twill, 5 thread regular Satin & Sateen.

Unit-V Chemical Processing of Textiles **9 Hours**

Objectives & methods of pretreatment processes - singeing, desizing, scouring, bleaching; Mercerization of cotton, Degumming of silk, Carbonizing of wool; Definition & classification of dyeing, printing & finishing; Wet process sequences for cotton material; Terminology- Material to Liquor ratio, shade percentage, dye exhaustion percentage, expression percentage, print paste, thickener.

Total **45 Hours**

Text books:

7. Introduction to Textile Fibres- H.V. Sreenivasa Murthy. WPI.
8. Essential Elements of Practical Cotton Spinning-T.K.Pattabhiram. Somaiya Publications Pvt Ltd.
9. Woven Fabric Production Vol-I & Vol-II. NCUTE.
10. Fabric Structure and Design- N. Gokarbeshan. New Agre International Publishers.
11. Chemical Processing of Textiles- Dr. C.V. Koushik and Mr. Antao Irwin Jasico. NCUTE.

References:

1. A Textbook of Fibre Science and Technology- S.P.Mishra. New Age International Publishers.
2. Spun Yarn Technology- Eric Oxtoby. Butterworths
3. Fundamentals of Spun Yarn Technology- C.A.Lawrence. CRC Press.
4. The Mechanism of Weaving- Thomas W. Fox.Legare Street Press.
5. Watson's Textile Design and Colour. Elementary weaves- Z. Grosicki.WP.
6. Chemical Processing of Handloom Yarns and Fabrics- R.B. Chavan. IIT Delhi. Image Print.

Course Title	: **MATHEMATICS-II**					**Semester –II**
Course Code	: **25BS102**	**L**	**T**	**P**	**C**	
Course Category	: **BASIC SCIENCE**	2	1	0	3	

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1	Identify specific elements in a matrix and perform basic algebraic operations as addition, subtraction, scalar multiplication, and matrix multiplication.
CO2	Apply Integration for cumulative effect.
CO3	Relate the connection between algebra and geometry through graphs of lines and curves.
CO4	Learn to view vectors geometrically and graph them and learn about the applications of vectors.
CO5	Apply the concepts of statistics in solving real life problems.

Unit-I Algebra –II **9 Hours**

Introduction to matrix, rows, columns, identify specific element in matrix, transpose of matrix, some special type of matrices – row matrix, column matrix, null, singleton, scalar, Identity, square Diagonal Matrices (upper and lower triangular matrix). Algebraic operations of matrix- addition, subtraction, scalar multiplication with matrix, matrix multiplication.

Determinant of a matrix of order two and three. Singular and non-singular matrix, Minors and Cofactors, Adjoint and Inverse of a Matrix, Applications of Determinants and Matrices, convert simultaneous linear equation of 2 and 3 variables in matrix form- Solution of system of linear equations (Cramer's rule only).

Unit-II Integral Calculus **9 Hours**

Integration as inverse operation of differentiation. Integration Using by some standard and Trigonometric Identities, Integration by Substitution, Integration by Parts. Concept of finite integral (some examples), Geometric interpretation of Definite Integral (not for examinations), Use of formulas $\int_0^{\frac{\pi}{2}} sin^n x\, dx$, $\int_0^{\frac{\pi}{2}} cos^n x\, dx$ for solving problems (where m and n are positive integers).

Unit-III Co- Ordinate Geometry **9 Hours**

Points on Cartesian plane, distance between two points, section formula, midpoint formula, collinear points. Basic properties to identify different types of triangles and quadrilaterals.

Equation of straight line in various standard forms (without proof), intersection of two straight lines, angle between two lines. Parallel and perpendicular lines, perpendicular distance formula.

Unit-IV Vector Algebra **9 Hours**

Points in two and three dimensional plane, Concept of direction. Introduction to vectors, magnitude of vector, unit vector, position vectors, types of vectors. Addition of vectors – triangle law, parallelogram law, subtraction of vector, properties of vector addition, Multiplication of a Vector by a Scalar, Components of a vector, Vector joining two points. Scalar (or dot) product of two vectors.

Unit-V Statistics-2 and SQC **9 Hours**

Variance (population and sample), Standard Deviation (Concept, Formula and Calculation), Coefficient of Variation (CV%) (Definition importance and Applications).

Concept of samples, types of samples, Control charts for measurements ($\bar{X}$ and R charts). Control charts for attributes (c and np charts)

Total **45 Hours**

Text books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 40th Edition, 2007.
2. G. B. Thomas, R. L. Finney, Calculus and Analytic Geometry, Addison Wesley, 9th Edition, 1995.
3. S.S. Sabharwal, Sunita Jain, Eagle Parkashan, Applied Mathematics, Vol. I & II, Jalandhar.
4. Mathematics NCERT Textbook for Class XI, 2024-25 Edition.

5. Mathematics NCERT Textbook for Class XII part I, 2024-25 Edition. Mathematics NCERT Textbook for Class XII part II, 2024-25 Edition.

References:

1. Comprehensive Mathematics, Vol. I & II by Laxmi Publications, Delhi.
2. K. Hoffman and R. Kunze: Linear Algebra.
3. Reena Garg & Chandrika Prasad, Advanced Engineering Mathematics, Khanna Publishing House, New Delhi.
4. Johnson, R.A., Miller, I and Freund J, "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.
5. J R Nagla, Statistics for Textile Engineers, Woodhead, 2014. Das, B.C., & Mukherjee, B.N. – Vector Analysis (U.N. Dhur & Sons)

Course Title	: **APPLIED PHYSICS**					**Semester –II**
Course Code	: **25BS103**	**L**	**T**	**P**	**C**	
Course Category	: **BASIC SCIENCE**	2	1	0	3	

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Identify physical quantities, select their units for use in engineering solutions, and make measurements with accuracy by minimizing different types of errors.

CO2 Explain Hooke's law and its significance and describe the viscosity of liquids, coefficient of viscosity and the various factors affecting its value and determine viscosity of an unknown fluid using Stokes' Law and the terminal velocity.

CO3 Define the terms; heat and temperature, measure temperature in various processes on different scales (Celsius, Fahrenheit, and Kelvin etc.). Distinguish between conduction, convection and radiation; identify different.

CO4 Define wave parameters: frequency, amplitude, wavelength, and velocity. Understand the formation of Image by lens and related numerical and illustrate the dispersion of light by prism.

CO5 State Ohm's law, calculate the equivalent resistance of a variety of resistor combinations. Determine the energy consumed by an appliance. Differentiate insulators, conductors and semiconductors. Understand the working of NPN & PNP transistor.

Unit-I Physical World, Units and Measurements 9 Hours

Physical quantities; fundamental and derived units, Units and systems of units (FPS, CGS and SI units), Dimensions and dimensional formulae of physical quantities, Principle of homogeneity of dimensions, Dimensional equations and their applications (conversion from one system of units to other, checking of dimensional equations and derivation of simple equations), Limitations of dimensional analysis.

Measurements: Need of measuring instruments, least count, types of measurement (direct, indirect), Errors in measurements (systematic and random), absolute error, relative error, error estimation and significant figures.

Unit-II Properties of Matter **9 Hours**

Elasticity: Definition of stress and strain, moduli of elasticity, Hooke's law, significance of stress-strain curve. Viscosity and coefficient of viscosity: Terminal velocity, Stoke's law and effect of temperature on viscosity. Surface tension: concept, units, cohesive and adhesive forces, angle of contact, Ascent Formula (No derivation), effect of temperature and impurity on surface tension. Newton's laws of Gravitation, Universal Gravitational constant, Acceleration due to gravity and its variation on/ above/ below Earth's surface.

Unit-III Heat and Temperature **9 Hours**

Concept of heat and temperature, modes of heat transfer (conduction, convection and radiation with examples), scales of temperature and their relationship. Expansion of solids, liquids and gases, coefficient of linear, surface and cubical expansions and relation amongst them, Co- efficient of thermal conductivity, engineering applications.

Unit-IV Wave Motion and Optics **9 Hours**

Simple Harmonic Motion (definition and example only), Wave motion, transverse and longitudinal waves with examples, definitions of wave velocity, frequency and wave length and their relationship, amplitude, phase, phase difference, Free damped and forced vibrations with examples, resonance.

Basic optical laws; reflection and refraction, refractive index, Total internal reflection, Critical angle, Lens and image formation by lens, lens formula, power of lens and magnification. Refraction through a prism, angle of deviation, Dispersion of light by prism. Lasers: laser characteristics, applications of lasers.

Unit-V Electricity and Electronics **9 Hours**

Electric Current and its units, potential difference, Resistance and its units, series and parallel combination of resistances. Ohm's law and its verification, Heating effect of current, Electric power, Electric energy and its units.

Insulator, semi-conductor, conductor, intrinsic and extrinsic semiconductors, p-n junction, junction diode, forward and reverse bias and V-I characteristics, Transistor: description and three terminals, Working of PNP and NPN. Transistor connections: CB and CE connection (description and circuit diagram only).

Total **45 Hours**

Text books:

1. Text Book of Physics for Class XI & XII (Part-I, Part-II); N.C.E.R.T., Delhi.
2. New Simplified Physics by Sl Arora for Class XI & XII (Vol-1 &2), Dhanpat Rai & CO.
3. Concepts of Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi
4. A TEXT BOOK of Optics, N. Subramanyam, Brij Lal, MN Avahanulu, S Chand and Company Ltd.

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5. Nootan CBSE Board Physics Text Book For Class 11th and 12th, By Kumar-Mittal - Nageen Prakashan.

References:

1. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi.
2. Engineering Physics by DK Bhhatacharya& Poonam Tandan; Oxford University Press, New Delhi.
3. Modern approach to Applied Physics-I and II, AS Vasudeva, Modern Publishers.
4. Schaum's outline of applied physics / 4th edition by Arthur Beiser.

Course Title	:	**INTRODUCTION TO IT SYSTEM**				**Semester –II**
Course Code	:	**25ES102**	**L**	**T**	**P**	**C**
Course Category	:	**ENGINEERING SCIENCE**	3	0	0	3

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Identify computer system components and the concept of the Internet and how it works.

CO2 Explain the purpose, functions and components of an operating system, different types of operating systems and installation steps.

CO3 Explain the Office tools and the fundamentals of AI.

CO4 Structure web pages using elements like headings, paragraphs, lists, tables and forms

CO5 Explain the fundamental concepts of C, including syntax, data types, and operators.

Unit-I Computer Basics & Internet Knowledge 12 Hours

Components of computer: Central Processing Unit, Computer Memory and Storage, Input Output Media and other Peripheral Devices, Digital India portals(state and national portal) and college portals.

Basics Internet skills-understanding browser, Evolution of Computers, Classification of Computer, Generations of Computers , The Computer system, Applications of Computers.

INTERNET: Applications of Internet – Getting connected to Internet – World Wide Web (www) – E-mail– Creating E-mail id, Sending, Receiving and Attaching Document.

Unit-II Operating System 8 Hours

Operating system-Introduction, Types of operating system, DOS, Linux, UNIX, MS Windows. UNIX shell commands, shell and kernel, OS Installation (Linux and MS Windows).

Unit-III Open Office & AI 9 Hours

Working with Office Tools: Writer, open office spreadsheet (Calc), open office impress (MS- office) Artificial Intelligence – Definition – Types – History – Structure of AI – Goals – Importance – Techniques.

Unit-IV HTML & CSS for Web Designing **8 Hours**

Introduction to HTML- Basic structure of an HTML -Creating an HTML document -Mark up Tags-Heading-Paragraphs-HTML Tags-Elements of HTML.

Introduction to Cascading Style Sheets- Creating Style Sheet - CSS Properties - CSS Styling(Background, Text Format, Controlling Fonts) - Working with block elements and objects - Working with Lists and Tables - CSS Id and Class .

Unit-V C Programming Language **8 Hours**

Program- Introduction to C-Variables, Constants & Data types- C operators - I/O statements - Control Statements- User defined functions, Basic conditional statements, Simple C Programs.

Total **45 Hours**

Text books:

1. Introduction to IT Systems , Khanna Publishing House
2. Introduction to Information Technology — Rajaraman, V.

References:

1. Foundations of Information Systems (OpenStax)-Dr. Mahesh S. Raisinghani
2. HTML & CSS: Design and Build Websites – Jon Duckett
3. The C Programming Language- Brian W. Kernighan & Dennis M. Ritchie
4. Computers Information Technology — Jon Marks
5. C Programming: A Modern Approach- K. N. King
6. Understanding Operating Systems — Ann McHoes & Ida Flynn

Course Title	:	**FUNDAMENTALS OF ELECTRICAL, ELECTRONICS ENGINEERING**				**Semester –II**
Course Code	:	**25ES104**	**L**	**T**	**P**	**C**
Course Category	:	**ENGINEERING SCIENCE**	2	1	0	3

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1	Identify system components and working principles of electrical components, Signals and IC.
CO2	Explain the basics of op-amp.
CO3	Explain fundamental concepts of electric and magnetic circuits.
CO4	Describe AC Circuit Fundamentals.
CO5	Describe Electromagnetic Principles, motors and Transformer Working.

Unit-I **Overview of Digital Electronics, Electronics Components & Signals** **9 Hours**

Passive & Active components: Resistors, Capacitors, Inductors. Source transformation: current to voltage & voltage to current, P-N junction Diode, FET, BJT, flip flop -introduction. Ohms law, Types of signal waveform, Ideal/non- ideal voltage/current source, Independent /dependent voltage /current source, Basic Logic Gates.

Unit-II **Overview of Analog Circuits** **9 Hours**

Operational amplifier –Ideal op-Amp, Practical op-amp, open loop & closed loop configuration. Block diagram of op-Amp, Application of op-amp as amplifier, adder, differentiator and integrator.

Unit-III **Electric and Magnetic Circuits** **9 Hours**

EMF, Current, Potential Difference, Power and Energy, M.M.F, Magnetic force, permeability, reluctance, leakage factor, BH curve. Faraday's law of electromagnetic induction, dynamically induced EMF, statically induced EMF, equation of self and mutual inductance, Analogy between electric and magnetic circuits.

Unit-IV **Electrical AC Circuits** **9 Hours**

Cycle, Frequency, Periodic time, Amplitude, RMS value, Average value, Peak value, Form factor, Peak factor ,Impedance, phase angle and power factor. Mathematical and phasor representation of alternating EMF and current, voltage and current relationship in star delta connection, AC in resistors, inductor and capacitors, AC in R-L series, R-C series, Power in AC Circuit, power triangle.

Unit-V **Transformer and Motors** **9 Hours**

Transformer-General construction and principle of different types of Transformers, Emf equation and transformation ratio of transformer, Autotransformer-Basics. Introduction, construction and working principle of Induction Motor and DC motor.

Total **45 Hours**

Text books:

1. Basic Electrical Engineering — Nagrath &
2. Principles of Electrical Engineering — V. K. Mehta
3. Op-Amps and Linear Integrated Circuits — Ramakant Gayakwad
4. Electric Machinery — P. S. Bimbhra

References:

1. Engineering Circuit Analysis — Hayt, Kemmerly, Durbin
2. Fundamentals of Electric Circuits — Alexander & Sadiku
3. Electrical Engineering Fundamentals — Vincent Del Toro
4. Electronic Devices and Circuits — J. B. Gupta
5. Electrical Machines — Chapman
6. Electricity and Magnetism — Edward M. Purcell

Course Title	:	**ENGINEERING MECHANICS**				**Semester –II**
Course Code	:	**25ES106**	**L**	**T**	**P**	**C**
Course Category	:	**ENGINEERING SCIENCE**	2	1	0	3

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Identify the force systems for given conditions by applying the basics of mechanics.

CO2 Determine unknown force(s) of different engineering systems.

CO3 Apply the principles of friction in various conditions for useful purposes.

CO4 Find the centroid and centre of gravity of various components in engineering systems.

CO5 Select the relevant simple lifting machine(s) for given purpose.

Unit-I Basics of Mechanics and Force System **9 Hours**

Significance and relevance of Mechanics, Applied mechanics, Statics, Dynamics. Space, time, mass, particle, flexible body and rigid body. Scalar and vector quantity.

Introduction to Dynamics – speed, velocity and acceleration. Equation of liner motion. Motion under gravity and acceleration due to gravity. Simple numerical problems.

Force–unit, characteristics and effects of a force, Principle of transmissibility of force, Force system and its classification.

Composition of forces– Resultant, analytical method for determination of resultant for concurrent, and parallel co-planar force systems – Law of triangle, parallelogram and polygon of forces.

Resolution of a force- Orthogonal components of a force, moment of a force, Varignon's Theorem.

Unit-II Equilibrium **9 Hours**

Equilibrium and Equilibrant, Free body and Free body diagram (concept only), Condition(s) of equilibrium.

Lami's Theorem– statement and explanation, Application for various simple engineering problems.

Types of beams, supports (simple, hinged, roller and fixed) and loads acting on beam (vertical and inclined point load, uniformly distributed load).

Beam reaction for cantilever, simply supported beam without overhang – subjected to combination of Point load and uniformly distributed load.

Unit-III Friction **9 Hours**

Friction and its relevance in engineering, types and laws of friction, limiting equilibrium, limiting friction, co-efficient of friction, angle of friction, angle of repose, relation between co-efficient of friction and angle of friction.

Equilibrium of bodies on level surface subjected to force parallel and inclined to plane. Equilibrium of bodies on inclined plane (single object) subjected to force parallel to the plane only.

Unit-IV Centroid and Centre of Gravity **9 Hours**

Centroid of geometrical plane figures (square, rectangle, triangle, circle, semi-circle, quarter circle) Centroid of composite figures composed of not more than three geometrical figures.

Centre of Gravity of simple solids (cube, cuboid, cone, cylinder) Centre of Gravity of composite solids composed of not more than two simple solids.

Unit-V Simple Lifting Machine **9 Hours**

Simple lifting machine, load, effort, mechanical advantage, applications and advantages. Velocity ratio, efficiency of machines, law of machine. Ideal machine, friction in machine, maximum Mechanical advantage and efficiency, reversible and non-reversible machines, conditions for reversibility.

Velocity ratios of simple axle and wheel, Differential axle and wheel, Simple screw jack, and Worm and Worm wheel.

Total **45 Hours**

Text books:

1. Ghosh, B.B,Engineering Mechanics,Vikas Publishing House Pvt. Ltd.
2. D.S. Bedi, Engineering Mechanics, Khanna Publications,New Delhi (2008).
3. Khurmi, R.S., Applied Mechanics, S.Chand & Co. NewDelhi.
4. Bansal RK, A text book of Engineering Mechanics, Laxmi Publications.

References:

1. Ramamrutham, Engineering Mechanics, S.Chand & Co. New Delhi.
2. Dhade, Jamadar & Walawelkar, Fundamental of Applied Mechanics, Pune Vidhyarthi Gruh.
3. Ram, H.D.; Chauhan, A.K., Foundations and Applications of Applied Mechanics, Cambridge University Press.
4. Meriam, J.L., Kraige, L.G., Engineering Mechanics-Statics, Vol. I, Wiley.

Course Title	: **APPLIED PHYSICS LABORATORY**					**Semester –II**
Course Code	: **25BS107**	**L**	**T**	**P**	**C**	
Course Category	: **BASIC SCIENCE**	0	0	2	1	

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Select right kind of measuring tools (Meter scale, Vernier caliper, Screw gauge, etc.) for determining dimensions of physical quantities and make measurements with accuracy and precision.

CO2 Measure temperature under different conditions and different scales of temperature measurements. Apply knowledge of optics to determine focal length and magnifying power of optical lenses.

CO3 Verify Ohm's law for flow of current, verify laws of series and parallel combination of resistances. Understand the characteristics of a semiconductor diode and determine the knee voltage.

List of Practical's **30 Hours**

1. To measure length, radius of a given cylindrical object (test tube and beaker) using a Vernier Caliper and find volume of each object.
2. To determine diameter of a wire and thickness of cardboard using a screw gauge.
3. To determine force constant of a spring using Hooke's Law.
4. To determine the surface tension of water by capillary rise method.
5. To find the moment of inertia of a fly wheel.
6. To find the viscosity of a given liquid (Glycerine) by Stoke's law.
7. To measure room temperature and temperature of a hot bath using mercury thermometer and convert it into different scales.
8. Using a Simple Pendulum plot L – T and L – T2 graphs, hence find the effective length of second's pendulum using appropriate graph.
9. To study the relation between frequency and length of a given wire under constant tension using sonometer.
10. To determine focal length and magnifying power of a convex lens.
11. To measure wavelength of a He-Ne/diode laser using a diffraction grating.
12. To verify Ohm's law by plotting graph between current and potential difference.
13. To verify laws of resistances in series and parallel combination.
14. To draw V-I characteristics of a semiconductor diode and determine its knee voltage.

Note: Minimum 10 experiments to be performed.

Total **30 Hours**

References:

1. Text Book of Physics for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi
2. Comprehensive Practical Physics, Vol, I & II, JN Jaiswal, Laxmi Publications (P)Ltd.
3. Practical Physics by C. L. Arora, S. Chand Publication

Course Title	:	**INTRODUCTION TO IT SYSTEM LABORATORY**				**Semester –II**
Course Code	:	**25ES108**	**L**	**T**	**P**	**C**
Course Category	:	**ENGINEERING SCIENCE**	0	0	2	1

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Comfortably work on computer, install and configure OS.

CO2 Assemble a PC and connect it to external devices

CO3 Write documents, create worksheets, prepare presentation, protect information and computer from basics abuses/attacks.

List of Practical's **30 Hours**

1. Browser features, browsing, using various search engines, writing search queries.
2. Visit various e-governance/Digital India portals; understand their features and services offered.
3. Read Wikipedia pages on computer hardware components, look at those components in lab, identify them, recognize various ports/interfaces and related cables, etc.
4. Install Linux and windows operating system on lab machine and explore various options.
5. Connect various peripherals (printer, scanner, etc.) to computer; explore various features of peripheral and their device driver software.
6. Practice HTML commands, try them with various values make your own Webpage.
7. Explore feature of Open Office tools, create documents, Presentations, and Resume using these features, do it multiple times.
8. Explore security features of Operating Systems and Tools, try using them and see what happens.
9. Practice simple C programs.

Note : This is a skill course .More you practice, better it will be.

Total **30 Hours**

References:

1. R.S Salaria, Computer Fundamentals, Khanna Publishing House.
2. Ramesh Bangia, PC Software Made Easy-The PC Course Kit, Khanna Publishing House.
3. Web design with HTML & CSS- Prem Kumar.

Course Title	:	**FUNDAMENTAL OF ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY**				**Semester –II**
Course Code	:	**25ES110**	**L**	**T**	**P**	**C**
Course Category	:	**ENGINEERING SCIENCE**	0	0	2	1

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Explain the working principles and functions of simple electric circuits and common electrical machines.

CO2 Describe the characteristics and behavior of signal waveforms, electric and magnetic circuits, and the significance of the B-H Curve in magnetism.

CO3 Explain the working principles, characteristics, and functions of different types of OP-AMPs and control systems.

List of Practical's **30 Hours**

1. Determine the permeability of magnetic material by plotting its B-H curve.
2. Measure voltage, current and power in 1-phase circuit with resistive load.
3. Measure voltage, current and power in R-L-C Series circuit with and without capacitor.
4. Connect single phase transformer and measure input and output Quantities.
5. Determine the transformation ratio (K) of 1-phase transformer.
6. Connect resistors in series and parallel combinations on bread board and measure its value using Multimeter.
7. Identify various active and passive electronic components in the given circuit.
8. Use LCR-Q tester to measure the value of given capacitor and inductor.
9. Determine the value of given resistor using digital Multimeter to confirm with colour code.
10. Test the performance of P-N junction diode.
11. To measure the 3-phase induction motor line and phase voltage and current values.
12. Identify the three terminals of transistor using digital Multimeter.
13. Test the performance of transistor switch circuit.
14. Test OP-Amp as amplifier, Integrator and differentiator.
15. Logic gate verification using trainer kit.

Note : Minimum 10 experiments to be performed.

Total **30 Hours**

References:

1. Fundamentals of electrical and electrical engineering with lab manual –susan s Mathew.
2. Electronics lab manual by KA Navas.
3. Electronic devices and circuit laboratory manual –Srinivasa Murthy.

Course Title	:	**ENGINEERING MECHANICS LABORATORY**				**Semester –II**
Course Code	:	**25ES112**	**L**	**T**	**P**	**C**
Course Category	:	**ENGINEERING SCIENCE**	0	0	2	1

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Predict the force systems for given conditions by applying the basics of mechanics and find unknown force(s) of different engineering systems.

CO2 Apply the principles of friction in various conditions for useful purposes.

CO3 Find the centroid and centre of gravity of various components in engineering systems and predict the relevant simple lifting machine(s) for given purposes.

List of Practical's **30 Hours**

1. To study various equipment related to Engineering Mechanics.
2. Determine resultant of concurrent force system applying Law of Polygon of forces using force table.
3. Determine resultant of concurrent force system graphically.
4. Determine resultant of parallel force system graphically.
5. Verify Lami's theorem.
6. Study forces in various members of Jib crane.
7. Determine support reactions for simply supported beam.
8. Obtain support reactions of beam using graphical method.
9. Determine coefficient of friction for motion on horizontal and inclined plane.
10. Determine centroid of geometrical plane figures
11. To find the M.A., V.R., Efficiency & law of machine for Differential Axle and wheel.
12. To find the M.A., V.R., Efficiency and law of machine for Simple Screw Jack.
13. Derive Law of machine using Single purchase crab.
14. Derive Law of machine using double purchase crab.
15. Derive Law of machine using Weston's differential or wormed geared pulley block.

Note : Minimum 10 experiments to be performed.

Total **30 Hours**

References:

1. Ramamrutham, Engineering Mechanics, S. Chand & Co. New Delhi.
2. Dhade, Jamadar & Walawelkar, Fundamental of Applied Mechanics, Pune Vidhyarthi Gruh.
3. Ram, H. D.; Chauhan, A. K., Foundations and Applications of Applied Mechanics, Cambridge University Press.
4. Meriam, J. L., Kraige, L.G., Engineering Mechanics- Statics, Vol. I, Wiley Publication, New Delhi.

Diploma in Handloom & Textile Technology

Curriculum & Syllabus (Semester III)

S No	Course Category	Course Code	Course Title	Hours / week			Total Hrs / week	Credits
				L	T	P		
1	Programme Core	25HTPC201	Textile Fibres	3	0	0	3	3
2	Programme Core	25HTPC202	Yarn Manufacturing Technology	3	0	0	3	3
3	Programme Core	25HTPC203	Handloom Weaving Technology	3	0	0	3	3
4	Programme Core	25HTPC204	Fabric Structure – I	2	1	0	3	3
5	Programme Core	25HTPC205	Chemical Processing of Textiles - I	3	0	0	3	3
6	Programme Core	25HTPC206	Handloom Weaving Technology Laboratory	0	0	4	4	2
7	Programme Core	25HTPC207	Colour Concept and Textile Design Laboratory	0	0	2	2	1
8	Programme Core	25HTPC208	Chemical Processing of Textiles Laboratory – I	0	0	4	4	2
9	Audit	25AU201	Essence of Indian Knowledge & Tradition	2	0	0	2	0
				Total			**27**	**20**
Bridge Course								
10	Bridge Course	25BS110	Mathematics	2	1	0	3	3
11	Bridge Course	25BS111	Applied Chemistry	2	1	0	3	3
12	Bridge Course	25BS112	Applied Physics	2	1	0	3	3

Course Title	: **TEXTILE FIBRES**					**Semester -III**
Course Code	: **25HTPC201**	**L**	**T**	**P**	**C**	
Course Category	: **PROGRAMME CORE**	3	0	0	3	

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Define and classify textile fibres and explain the basic structure of fibres and essential requirements.

CO2 Describe the structure, properties, and uses of major cellulosic fibres such as cotton, flax, jute, hemp and regenerated cellulosic fibres such as viscose, modal and lyocell.

CO3 Explain the structure, processing steps, properties and uses of protein fibres with special reference to wool and silk.

CO4 Explain basic polymer concepts, man-made fibre spinning methods and yarn orientation, including melt, dry and wet spinning and LOY, POY, FDY and DTY.

CO5 Describe the polymerisation, properties and applications of major synthetic fibres such as nylon, polyester, polypropylene and elastane.

Unit-I Introduction to Textile Fibres **9 Hours**

Definition of textile fibre; essential and desirable properties of a textile fibre; classification of fibres: natural, regenerated, synthetic, inorganic; staple vs filament; mono & multi filament. Basic morphology of textile fibres (general features): longitudinal view, cross-sectional shape, surface characteristics and internal structure. Selection of fibres for specific end uses: summer & winter garments.

Unit-II Cellulosic Fibres **9 Hours**

Cotton: Origin, classification, morphological structure, chemical composition, physical & chemical properties and uses. Flax, Jute and Hemp: extraction process, properties and uses. Basic comparison of cotton vs jute vs flax vs hemp.

Regenerated Cellulosic Fibres: brief introduction, viscose manufacturing process, physical & chemical properties and uses. Brief introduction to Modal, Lyocell & Acetate Rayon and their special features.

Unit-III Protein Fibres **9 Hours**

Wool: Varieties and grades, morphological structure, chemical composition, properties, woollen and worsted processing flow and uses.

Silk: Types of silk - mulberry, tasar, eri and muga; lifecycle of the mulberry silkworm; reeling, throwing, and doubling; degumming and weighing of silk; morphology, chemical composition and properties of silk; process outline for spun silk; uses of silk.

Unit-IV Polymer Basics and Synthetic Fibre Spinning **9 Hours**

Basic terms: polymer, monomer, repeating unit, degree of polymerisation. Classification of polymers and polymerisation, Man-made fibre spinning techniques: melt spinning, dry spinning and wet spinning.

Brief introduction and applications of dope-dyed fibres, delustered fibres, and microfibres. Brief study of drawing, types of heat-setting, influence of heat setting on fibre behaviour: Brief study of draw texturising and air-jet texturising. Introduction to LOY, POY, FDY, and DTY.

Unit-V Synthetic Fibres **9 Hours**

Brief study of polymerisation and process, properties and application of polyamide (Nylon 6, Nylon 6,6), polyester, and polypropylene. Brief introduction and applications of elastane/spandex fibre.

Total **45 Hours**

Text books:

2. Manufactured Fibre Technology, Gupta, V.B., Kothari, V.K.,1997, Springer Netherlands
3. Fibre Science and Technology, SP Mishra, New-Age International Ltd., New Delhi
4. Production of Synthetic Fibres, Vaidya A A, 1988, Prentice Hall of India, New Delhi

References:

2. Handbook of Textile Fibre, Vol. I & II, Cook Gordon J,1984, Woodhead Publishing
3. UK Book of Fibre Chemistry, Ed. M Lewin and E. M. Pearce, 1998, Marcel Dekker Inc.
4. Textile Fibre, Shenai V A, Sevak Publications, Mumbai
5. Manmade Fibres, R.W. Moncrieff, Butterworth, London
6. Polymer Science, Gowariker V R, Viswanathan NV and Sridhar J, 1996, New Age International Ltd., New Delhi.

Course Title	:	**YARN MANUFACTURING TECHNOLOGY**				**Semester -III**
Course Code	:	**25HTPC202**	**L**	**T**	**P**	**C**
Course Category	:	**PROGRAMME CORE**	3	0	0	3

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Explain the objectives, principles, and operations of ginning and blowroom fiber preparation.

CO2 Describe carding actions, elements, auto-levelling principles

CO3 Express objectives, mechanisms, and operational cycle of combing processes.

CO4 Outline mechanisms of draw frame, speed frame, drafting, and auto-leveller.

CO5 Analyze principles of ring spinning, doubling, and reeling.

Unit-I Ginning and Blowroom **9 Hours**

Process flow chart of Carded and Combed yarns; Objective, description and working of different types of Gins; Objectives, principles and description of Opening, Cleaning and Blending Machines used in Blow Room; Lap feed and Chute feed systems; Cleaning efficiency and production calculations in Blow Room

Unit-II Carding **9 Hours**

Objectives of Carding- Carding action, Stripping action, Passage of material through high production Card; Description and functions of Mote knives, Under casing, Back plate, Front plate, Flats, Heel and Toe arrangement; Coiler mechanism; Principles of short term, Medium term and long term Auto-levelling; Production calculations of Carding machine.

Unit-III Combing **9 Hours**

Objectives and advantages of Combing process; Lap preparation techniques - Comber Lap preparatory machines – Description and passage of material through Sliver Lap machine, Ribbon Lap machine and Super Lap former; Passage of material through a Modern Comber; Operations of Combing Cycle (Feeding, Nipping, Combing, Detaching and Top Combing); Forward feed, Backward feed; Half Lap; Piecing wave; Production calculation in preparatory to Combing and Combing Machines.

Unit-IV Draw Frame and Speed Frame **9 Hours**

Draw Frame – Objectives, principle and passage of material through a High Speed Draw Frame; Drafting systems used in Modern Draw Frames; Auto-Levelling - Open Loop and Closed Loop Auto Levellers; Draft and production calculations in Draw Frame;

Speed Frame – Objectives, principle and passage of material; Draft, Twist and Production calculations in Speed Frame.

Unit-V Ring Spinning, Doubling and Reeling **9 Hours**

Ring Spinning - Principle of yarn formation – Description and passage of material through Ring Spinning machine - Design features and functions of important elements of Ring Spinning machine; Modern developments in Ring Spinning machines; Draft, Twist and Production calculations in Ring Spinning machine;

Doubling- Objectives, description and working principle of the Doubling process;

Reeling - Objectives description and working principle of the Reeling process.

Total **45 Hours**

Text books:

1. K. Ganesh and A. R. Garde, “Cotton Spinning”, Textile Association (India), Ahmedabad, 1980
2. W. Klein, “A Practical Guide to the Blowroom and Carding” The Textile Institute, Manual of Textile Technology Short Staple Spinning Series Volume 2, 2nd Edition, 2000.

3. W. Klein, “A Practical Guide to Combing and Drawing” The Textile Institute, Manual of Textile Technology Short Staple Spinning Series Volume 3, 2nd Edition,1987.
4. W. Klein, “A Practical Guide to Ring Spinning” The Textile Institute, Manual of Textile Technology Short Staple Spinning Series Volume 4, 2nd Edition,1987.
5. Carl A. Lawrence , “Fundamentals of Spun Yarn Technology”, CRC Publications, 2003.
6. Eric Oxtoby, “Spun Yarn Technology”, Butterworths, 1987.

References:

1. Peter R Lord, "Handbook of Yarn Production: Technology, Science and Economics ", The Textile Institute, Manchester, 1999.
2. Klein W., "The Technology of Short-staple Spinning ", The Textile Institute, Manual of Textile Technology Short Staple Spinning Series Volume 1, 2nd Edition, Manchester, 1998.
3. Indhira Doraiswamy, Chellamani P. and Pavendhan A., "Cotton Ginning, Textile Progress", The Textile Institute. Manchester, 1993.
4. R. Chattopadhyay, Advances in Technology of Yarn Production, NCUTE.

Course Title	:	**HANDLOOM WEAVING TECHNOLOGY**				**Semester -III**
Course Code	:	**25HTPC203**	**L**	**T**	**P**	**C**
Course Category	:	**PROGRAMME CORE**	3	0	0	3

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1	Categorize the types of yarn packages, Winding, Warping and Sizing preparatory process of handlooms.
CO2	Describe the evaluation of handlooms, parts, passage, primary motions and shed formation of handlooms.
CO3	Explain secondary, auxiliary motions and other mechanisms of handloom.
CO4	Calculate different types of yarn numbering systems.
CO5	Calculate the folded yarn and various reed count systems.

Unit-I Weaving Preparatory Process 9 Hours

Winding – Objectives- different forms of yarn packages – Hanks, Cones, Cheeses and Spools, Double Flanged Bobbins, Pirns– purpose and use; Warping – objectives of Warping – Essential characteristics of warp and weft yarns: Methods of warping – Peg warping, Vertical and Sectional Warping, ball warping – Merits & Demerits of warping methods; Sizing – objectives and importance of sizing – Ideal sizing- Ingredients used in sizing and their functions; Various forms of sizing – Hank sizing and street warp sizing; Common defects during sizing – Causes and remedies.

Unit-II Handlooms and Primary Mechanisms **9 Hours**

Evolution of handlooms- Primitive Looms -Tree loom - Loin loom, Vertical loom, Pit loom, Throw & Fly Shuttle Pit loom,- Various parts of a handloom and their functions; Passage of warp in a handloom; Motions of a handloom – Primary, Secondary and Auxiliary motions; Primary Motions- Objectives- Different types of shed formations – Centre closed, Bottom closed, Top closed, Open and Semi-open shed- merits demerits; Shedding mechanism of a handloom- Treadles and heald reversing motions – Roller system, Pulley reversing system, Jack and lam arrangements. Picking mechanism of a handloom; Types of shuttles – throw shuttle, fly shuttle and roller shuttle; Beat-up – Closed shed beating, Crossed shed beating; Reeds – Bamboo, Pith-bound, Steel, All-metal and V Reed.

Unit-III Secondary, Auxiliary Motions and Dobby Mechanisms **9 Hours**

Secondary Motions; -Let-off motion in handlooms - Objectives – Ratchet and pawl, rope and weight, rope–lever and weight; Take-up motion in handlooms- Objectives– Poker rod and ratchet wheel and Pawl, worm and worm wheel; Auxiliary motion of a handloom – Temple motion Objectives – Flat Wooden Temple, Roller Temple and Ring Temple; Terry motion- Objectives-Butt arrangement; Handloom dobbies – Objectives – Barrel, Lattice dobby, Mechanisms, working principles and suitability in Handlooms.

Unit-IV Yarn Numbering Systems and Conversions **9 Hours**

Definition of Yarn Count- Introduction to Yarn numbering systems- Indirect systems – New English cotton, New French, Decimal, Spun silk, Worsted, Woollen Yorkshire and Linen systems; Direct systems – Denier-flax/jute/hemp, Dram, Denier Metric; Universal system of Yarn numbering – Tex and its derivatives – Millitex, Decitex and Kilotex; Determination of conversion factors- Conversion of yarn count – Indirect to Indirect, Direct to Direct, Indirect to Direct and Direct to Indirect

Unit-V Folded Yarn, Reed, Heald Count and Warping Calculations **9 Hours**

Expression of count of folded yarns; Direct and Indirect Systems - Contraction due to twisting; Determination of equivalent/resultant count of folded yarns (Tex and Ne); Average count of warp; Combination of different counts- Direct and Indirect systems (Tex and Ne); Reed Count systems – Stock port, Huddersfield, Redcliff, Iris, and Bradford systems; Heald count calculations. Handloom Warping calculations – Sectional Warping- Total ends, No of sections.

Total **45 Hours**

Text books:

1. Talukdar, M.K., Sriramulu, P.K. and Ajgaonkar, D.B., “Weaving Machine, Mechanism, Management”, 1998.
2. Banerjee, N.N., “Weaving Mechanism”, 1982.
3. Marks, R. and Robinson, A.T.C., “Principle of Weaving”, 1976.
4. Sengupta, “Weaving Calculation”, 1963.
5. Mr.Vadivel Volume-1 “Weaving Calculations”
6. Ormerod, A. and Sondhelm, W.S., “Weaving – Technology and Operations”, 1995.

7. Goorvder, V., "Cotton Weaving", 1979.
8. TAI, "Weaving Tablets", 2013.
9. Lord, P.R. and Mohamad, "Weaving: Conversion from yarn to Fabric", 1982.

References:

1. Hanton, W. A., "Mechanics for Textiles Student an Introduction to the study of mechanics for Textiles student", 1960.
2. Greenwood, Hony., "Hand book of weaving and manufacturing", 2nd Edition, 1954.
3. Rama Verma, "Handloom weaving", 1959.
4. David Ezakia, "Preparatory Process for weaving with calculation: including Development of the modern Power Loom".
5. Z Grosicki, "Watsons Textile Design and Colour", 2nd Edition

Course Title	:	**FABRIC STRUCTURE – I**				**Semester -III**
Course Code	:	**25HTPC204**	**L**	**T**	**P**	**C**
Course Category	:	**PROGRAMME CORE**	2	1	0	3

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Identify and construct plain weave and its derivatives

CO2 Create different twill weave structures and its derivatives

CO3 Draw the design of Diamond and Satin weaves

CO4 Develop woven fabric designs suitable for towels

CO5 Create fabric design using different color and weave effects.

Unit-I Introduction to Textile Designing **9 Hours**

Classification of textile fabrics; classification of woven fabrics-simple, compound and complex: fundamental aspects of woven fabrics-count of graph paper, methods of representing design on graph paper; Principle of Design, draft, denting, lifting & tie-up plans. Types of draft-straight draft, skipped draft, pointed draft, herring bone draft, mixed draft, sateen draft etc. Plain weave-ornamentation of plain weave: study of derivative structures of plain weave-regular and irregular warp rib, weft rib, hopsack and basket weaves, stitched hopsack, extension of hopsack weaves- barley corn. Catch cord technique: Design, draft, denting, peg/tie up plan and thread interlacing diagram of above weaves.

Unit-II Twill Weaves and Its Derivatives **9 Hours**

Twill weaves up to 12 threads; classification of twills-warp faced twill, weft faced twill and equal faced twill, Left hand twill and right hand twill; Angle of inclination of twill -Steep twill and flat twill; study of derivatives of twill weaves- wavy twill (across and along the cloth)-herring bone, transposed twill, broken twill, elongated twill, combined twill, Drafts, lifting plan & tie up, treadling plan for the above designs.

Unit-III Diamond and Satin Weaves **9 Hours**

Diamond weave, Diaper weave, Twill dice check, regular and irregular sateen and satin up to 12 threads, satin dice check weaves; design, draft, denting, peg/tie up plan and thread interlacing diagram of above weaves. Difference between diamond and diaper, sateen and satin.

Unit-IV Towelling Weaves **9 Hours**

Honey comb weaves-ordinary honey comb, stitched honey comb and Brighton honey comb designs-cell formation; study of Huck-a-Back weave- Construction of standard Huck-a-back (10 x 10), Devon's Huck-a-back; mock leno and corkscrew weaves. Design, draft, and peg/tie-up plan and thread interlacing diagram of above weaves.

Unit-V Fancy and Colour Weave Effects **9 Hours**

Crepe weaves- construction upon sateen base, by combination of floating weaves with plain thread, by reversing and by insertion of one weave over another. Combination of weaves-twill and plain, mock-leno and plain, honey comb and plain, stripe and check effect by these combinations; Introduction to color and weave effects- continuous line effect, hounds tooth patterns, bird's eye and spot effects, hairline stripes, step patterns and all over effects.

Total **45 Hours**

Text books:

1. Grosicki Z. J." Watson's Textile Design and Color' ,Vol.1, Woodhead publications, Cambridge England, 2004.
2. Grosicki Z . J." Watson's Advanced Textile Design and Color' ,Vol II, Butterworth Lonon 1989.
3. Grammar of Textile Design by H. NISBET, F.T.I

References:

1. Wilson J., " Handbook of Textile Design', Textile Institute, Manchester, 2001
2. Horne C. E., " Geometric Symmetry in Patterns and Tilings" , Textile Institute, Manchester, 2000
3. Seyam A.M., 'Structural Design of Woven Fabrics, Theory and Practice', Textile institute, Manchester, 2002.
4. Georner D," Woven Structure and Design, part 1: Single Cloth Construction". WIRA, U.K., 1986
5. Georner D, " Woven Structure and Design Part 2: Compound Structures", WIRA, U.K., 1989.

Course Title	:	**CHEMICAL PROCESSING OF TEXTILES – I**				**Semester -III**
Course Code	:	**25HTPC205**	**L**	**T**	**P**	**C**
Course Category	:	**PROGRAMME CORE**	3	0	0	3

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Explain the need and procedure for pre-treatments of cotton materials.

CO2 Classify dyes, define the dyeing terms and select the appropriate machine for the process.

CO3 Explain the process of dyeing cotton with direct and reactive dyes with suitable recipe and process conditions.

CO4 Describe the process of dyeing cotton with vat, azoic and sulphur dyes with suitable recipe and conditions.

CO5 Explain the process of dyeing silk and wool with acid and metal complex dyes with suitable recipe and process conditions.

Unit-I Pretreatment of Cotton **9 Hours**

Need for preparation of grey goods & preparatory process sequence of cotton material. Singeing, objective & methods of singeing - Gas singeing machine description, working, precautions, merits & demerits. Desizing of cotton: objective, methods, special emphasis on Acid & enzyme desizing with merits & demerits. Scouring of cotton: objective, Chemistry, methods of scouring, Bleaching of Cotton: Objective, Chemistry, methods of bleaching, Process and mechanism of Sodium Hypochlorite & Hydrogen peroxide bleaching, OBA Treatment.

Unit-II Dyeing – Terminologies and Machines **9 Hours**

Dyeing Terminologies (Affinity, Adsorption, Absorption, Fixation, Percentage of Shade, Percentage of exhaustion, Percentage of expression, MLR & Substantivity), Dyeing machinery: Principle and working of J-Box, Jigger, Winch, Padding Mangles, Cabinet hank dyeing machines, package dyeing machine, HTHP Beam, Jet Dyeing, Soft Over Flow dyeing machine, Hydro extractor, Vertical Can dryer and Hot Air Stenter.

Unit-III Direct and Reactive Dyeing of Cotton **9 Hours**

Classification of dyes, brief introduction on the criteria for selection of dyes. Dyeing cotton with Direct Dyes: Classification, Mechanism, Recipe, Process conditions with procedure. After treatment of direct dyed cotton material with cationic dye fixing agent.

Dyeing of cotton with Reactive Dyes: Classification, Mechanism, Recipe, Process conditions with procedure for M, H and VS dyes.

Unit-IV Vat, Azoic and Sulphur Dyeing of Cotton **9 Hours**

Dyeing of cotton with Vat Dyes: Classification Mechanism, Recipe, Process conditions with procedure and concepts of Solubilised Vat Dyes.

Dyeing of cotton with Azoic Dyes: Mechanism, Recipe, Process conditions with procedure. Dyeing of cotton with Sulphur Dyes: Classification Mechanism, Recipe, Process conditions with procedure, and its common problems viz. Tendering & Bronziness.

Unit-V Pretreatment and Dyeing of Wool and Silk **9 Hours**

Pretreatment of Silk: Degumming and its methods, bleaching with Hydrogen peroxide. Dyeing of Silk with Acid & Metal Complex: Classification, Mechanism, Recipe, Process conditions with procedure.

Pretreatment & Setting of wool: Scouring and its methods, Bleaching with Hydrogen peroxide, Milling and its methods and Decatising.

Dyeing of Wool with Acid, Metal Complex: Mechanism, Recipe, Process conditions with procedure.

Total **45 Hours**

Text books:

1. Chemical Processing of Textiles by Dr. C.V. Kaushik and Mr. Antao Irwin Josico, NCUTE.
2. Fundamentals and practices in colouration of Textiles, J.N.Chakraborty, Woodhead Publishing.
3. Bleaching, mercerizing and dyeing of cotton materials, R.S.Prayag.
4. Textile Preparation and Dyeing, Asim Kumar Roy Choudhury, Oxford and IBH Publishing Co. Pvt. Ltd., 2006.

References:

1. Technology of Scouring and Bleaching, Trotman E.R., Griffin, London, 1968.
2. Technology of Textile processing Vol. II, III & VI by Dr. V. A. Shenai.
3. Chemical Technology in the pre-treatment process of Textiles, S.R.Karmakar, Elsevier publication.
4. Dyeing of wool, silk and man-made fibres, R.S.Prayag.
5. Handbook of Textile Processing Machinery, R.S.Bhagwat, Colour publication.
6. Guide to Wet Textile Processing Machines by J. N. Shah, Elsevier Science & Technology.

Course Title	:	**HANDLOOM WEAVING TECHNOLOGY LABORATORY**				**Semester -III**
Course Code	:	**25HTPC206**	**L**	**T**	**P**	**C**
Course Category	:	**PROGRAMME CORE**	0	0	4	2

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Identify and sketch the main functional parts of a handloom and perform basic preparatory operations such as knotting, piecing, bobbin winding, pirn winding, and warping using handloom accessories.

CO2 Prepare simple weaving plans including design, draft, peg plan, and tie-up plan, and carry out loom preparatory processes such as drawing-in, denting, gaiting-up, and handloom setting.

CO3 Weave fabric samples on a handloom using plain weave, twill weave, and their derivatives, and produce stripe and check designs by applying suitable weave and colour arrangements.

Unit-I **60 Hours**

1. Sketching and familiarizing with different functional parts of a handloom.
2. Sketching and practice of various knots and piecing techniques.
3. Practice of bobbin winding and pirn winding.
4. Practice of warping using peg warping frame and sectional warping machine.
5. Study and preparation of design, draft, peg plan, and tie-up plan.
6. Practice of drawing-in and denting.
7. Practice of gaiting-up (loom gaiting).
8. Practice of tie-up and handloom setting.
9. Practice of weaving on a handloom.
10. Development of fabric samples using Plain weave and its derivatives.
11. Development of fabric samples using Twill weave and its derivatives.
12. Preparation of stripe and check effects using combinations of the above designs and weave plans.

Total **60 Hours**

Course Title	:	**COLOUR CONCEPT AND TEXTILE DESIGN LABORATORY**				**Semester -III**
Course Code	:	**25HTPC207**	**L**	**T**	**P**	**C**
Course Category	:	**PROGRAMME CORE**	0	0	2	1

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Draw basic lines, foliage, and traditional motifs, and arrange motifs systematically using standard design bases.

CO2 Prepare colour wheels and apply appropriate colour schemes to develop simple and figured colour-and-weave design effects.

CO3 Create colour-and-weave patterns and accurately match colours using digital tools, Pantone references, and paint-mixing techniques.

List of Experiments **30 Hours**

1. Practice on drawing; types of Lines, direction of Lines, Variation of Lines & foliage drawing like small plants, flowers and creepers
2. Practice on developing traditional motifs like birds, animals and flowers
3. Prepare Colour Wheel (Primary, Secondary and Tertiary Colours)
4. Practice chart for colour schemes; Monochromatic, Analogous, Achromatic, Complementary colour, Single Complementary, Double Complementary, Split Complementary & Triadic.
5. Create Simple colour & weave effects in design paper by applying colour schemes for the following; stripes, checks, step pattern, Hound's-tooth patterns.
6. Apply colour schemes for special colour and weave effects for rib and corkscrew weaves

7. Apply colour schemes for figured colour and weave effects for the following; Simple and compound order of colouring, Distinct figured effects
8. Arrange motifs or figures in different bases for drop device and drop reverse design; Diamond base, Ogee base, Diagonal wave line base and Rectangular base
9. Arrange motifs or figures in different bases for Sateen system of distribution; Regular and irregular sateen arrangement, Layout preparation for shirting, Dothi, saree and chudidar
10. Digital-to-Physical Colour Matching : Use suitable capturing software to extract a colour palette from an original photograph, print the palette, and recreate each colour using paint to develop colour-identification and mixing skills; Study the Pantone Colour System, choose a Pantone shade, and mix paints to match it accurately, building understanding of colour standardization and precise paint-mixing techniques.

Total **30 Hours**

Course Title	:	**CHEMICAL PROCESSING OF TEXTILES LABORATORY – I**				**Semester -III**
Course Code	:	**25HTPC208**	**L**	**T**	**P**	**C**
Course Category	:	**PROGRAMME CORE**	0	0	4	2

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Pre-treatments of cotton, wool and silk material.

CO2 Dyeing of cotton with direct, reactive, vat, azoic and sulpur dyes using appropriate recipe for the given shade.

CO3 Dyeing of wool and silk with acid and metal complex dyes using appropriate recipe for the given shade.

List of Experiments **60 Hours**

1. Desizing of cotton with Acid and Enzyme.
2. Scouring of cotton.
3. Bleaching of cotton with Sodium hypochlorite.
4. Bleaching of cotton with hydrogen peroxide.
5. Dyeing of cotton with Direct dyes.
6. Dyeing of cotton with Reactive dyes.
7. Dyeing of cotton with Vat dyes.
8. Dyeing of cotton with solubilised Vat dyes.
9. Dyeing of cotton with Azoic dyes.
10. Dyeing of cotton with Sulphur dyes.
11. Study the effect of Liquor Ratio, Electrolytes & Temperature on direct dye.
12. Degumming & Bleaching of silk

Samrat

13. Scouring & Bleaching of Wool
14. Dyeing of Silk or Wool with Acid dyes.
15. Dyeing of Silk or Wool with Metal Complex dyes

Total **60 Hours**

Note: Minimum 12 experiments to be performed.

Course Title	:	**ESSENCE OF INDIAN KNOWLEDGE & TRADITION**				**Semester -III**
Course Code	:	**25AU201**	**L**	**T**	**P**	**C**
Course Category	:	**AUDIT**	2	0	0	0

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Identify the concept of Traditional Knowledge and its importance.

CO2 The need of Traditional Knowledge in science and importance of protecting it.

CO3 Illustrate the various enactments regarding Yoga.

CO4 Importance of Indian artistic knowledge.

CO5 Concepts of Traditional Knowledge through case study.

Unit-I Basic Structure of Indian Knowledge System **6 Hours**

Introduction to traditional knowledge- define traditional knowledge, nature and characteristics, scope and importance; Kinds of traditional knowledge (Unani/Siddha/Ayurveda); Indian Philosophy's- Vedas, Up Vedas. Vendange: Traditional Knowledge vs Western Knowledge.

Unit-II Modern Science and Indian Knowledge System **6 Hours**

Traditional knowledge and engineering: Traditional medicine system; Traditional knowledge and biotechnology, Traditional knowledge in agriculture; Traditional societies depend on it for their food and healthcare needs; Importance of conservation and sustainable development of environment; Management of biodiversity; Food security of the country and protection of knowledge.

Unit-III Yoga and Holistic Health Care **6 Hours**

Yoga- Etymology, definitions, aim, objectives and misconceptions, Its origin, history and development: Yoga and It's Practice-Branches of yoga, Meditation and Concentration-Meditation, Introduction, definition; Types of Meditation Yoga Therapy: Meaning and Definition, Principles and Discipline, Area and Limitation, Role Of Lifestyle and Diet In Yoga Therapy, Yoga for Health, Panchkosha; Hypertension, Heart Disease, Vision Defects, Insomnia, Headache, Mental Stress, Depression, Anxiety.

Unit-IV Indian Artistic Tradition **6 Hours**

Painting-Ancient Works, Artists, Canvas); Sculpture-Traditional Sculptures, Modern Sculptures, Poetry: Music: Dance- Different Types of dance forms present in traditional and modern times; Literature Traditional Literature Works (Authors, Work presented) Modern Literature Works (Authors, Work presented); Arts in Architecture- Feng Shu Different types of monuments in North India and South India, their direction, representation, built era.

Unit-V Case Studies **6 Hours**

Traditional knowledge in Engineering: Traditional knowledge in handicrafts and handlooms: Traditional knowledge in Literature; Traditional knowledge in modern medicine.

Total **30 Hours**

Text books:

1. Traditional Knowledge System in India, by Amit Jha, 2009.
2. Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, Pratibha Prakashan 2012.
3. Swami Jitatmanand, Holistic Science and Vedant, Bharatiya Vidya Bhavan.
4. Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkata.
5. R. Nagaswamy, Foundations of Indian Art, Tamil Arts Academy, 2002.

References:

1. Traditional Knowledge in Modern India-Preservation, Promotion, Ethical Access and Benefit sharing Mechnalsms by Nirmal Sengupta.
2. "Knowledge Traditions and Practices of India" Kapil Kapoor1, Michel Danino.
3. V. Sivaramakrishnan (Ed.), Cultural Heritage of India-course material, Bharatiya Vidya Bhavan, Mumbai. SthEdition, 2014 Vidya Bhavan.
4. Swami Jitatman and Modern Physics and Vedant, Bharatiya 5. Krishna Chaitanya, Arts of India, Abhinav Publications, 1987.

Course Title	: **MATHEMATICS**					**Semester -III**
Course Code	: **25BS110**	**L**	**T**	**P**	**C**	
Course Category	: **BRIDGE COURSE**	2	1	0	3	

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1	Appreciate of the important geometric study as well as the calculation and the mathematical analysis, by applying trigonometry concepts.
CO2	Find the effect of changing condition on a system.
CO3	Solved simple counting problems using permutation and combination concept concept.
CO4	Apply the concept of probability in random variable in solving real solving real life problem.
CO5	Analyse the quality of samples by applying sampling technique.

Unit-I Trigonometry **9 Hours**

Concept of angles, triangles (especially right angular triangle), measurement of angles in degrees and radians and their conversions. Pythagoras Theorem (without proof) and it's applications (some examples). Trigonometric ratios: trigonometric ratios of some special angles(0°, 30°, 45°, 60°, 90°). Trigonometric identities: Compound angle identities- $sin(A \pm B)$, $cos(A \pm B)$, $tan(A \pm B)$ (without proof)

Unit-II Co-Ordinate Geometry **9 Hours**

Points on Cartesian plane, distance between two points, section formula, midpoint formula, collinear points. Basic properties to identify different types of triangles and quadrilaterals.

Equation of straight line in various standard forms (without proof), intersection of two straight lines, angle between two lines. Parallel and perpendicular lines, perpendicular distance formula.

Unit-III Permutation & Combination **9 Hours**

Concept and use of permutation & combination. Value of $nCr$and nPr. Simple problems. Binomial theorem: Binomial theorem (without proof) for positive integral index (expansion and general form), finding 'r' th term, middle term(s), coefficient of $'xr'$ of expansion, x free term.

Unit-IV Probability and Random Variable **9 Hours**

Random experiment, outcomes, sample space, events, occurrence of events, exhaustive events, mutually exclusive events, independent events. Classical definition of probability, axioms of probability, probability of an event, probability of exhaustive events, mutually exclusive events, independent events.

Unit-V Statistical Quality Control **9 Hours**

Concept of samples, types of samples, Control charts for measurements ($\bar{X}$ and R charts). Control charts for attributes (p, c and np charts), Tolerance limits.

Total **45 Hours**

Text books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 40th Edition, 2007.
2. G. B. Thomas, R. L. Finney, Calculus and Analytic Geometry, Addison Wesley, 9th Edition, 1995.
3. S.S. Sabharwal, Sunita Jain, Eagle Parkashan, Applied Mathematics, Vol. I & II, Jalandhar.
4. Mathematics NCERT Textbook for Class XI, 2024-25 Edition.
5. Mathematics NCERT Textbook for Class XII part I, 2024-25 Edition.
6. Mathematics NCERT Textbook for Class XII part II, 2024-25 Edition.

References:

1. Comprehensive Mathematics, Vol. I & II by Laxmi Publications, Delhi.
2. K. Hoffman and R. Kunze: Linear Algebra.
3. Reena Garg & Chandrika Prasad, Advanced Engineering Mathematics, Khanna Publishing House, New Delhi.
4. Johnson, R.A., Miller, I and Freund J, "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.
5. J R Nagla, Statistics for Textile Engineers, Woodhead, 2014.
6. Das, B.C., & Mukherjee, B.N. – Vector Analysis (U.N. Dhur & Sons)

Course Title	:	**APPLIED CHEMISTRY**				**Semester -III**
Course Code	:	**25BS111**	**L**	**T**	**P**	**C**
Course Category	:	**BRIDGE COURSE**	2	1	0	3

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1	Explain the general properties of Atom & molecules, water along with its solutions.
CO2	Describe the suitability of oxidizing and reducing agent for domestic and industrial application.
CO3	Explain the principles of electrochemical cells, electrode potentials, and oxidation-reduction processes.
CO4	Define organic compounds and polymers suitable for economical industrial processing to obtain Eco-friendly finished products.
CO5	Describe states of matter chemical kinetics and economical techniques of reaction mechanism.

Unit-I **Atomic structure, Water & Solution** **9 Hours**

Bohr model of atom, Electronic configuration of elements, Definition of Atomic number, Mass number

Classification Soft and Hard water, Salt causing hardness, Unit of hardness, Action of soap on water, Types of Hardness, Causes of hardness, Disadvantages of using hard water, TDS.

Introduction of solution, Solvent & Solute.Types of solutions.Method to express concentration of solution-Mass percentage (W/W), Volume Percentage (V/V), Mass by Volume percentage (W/V).

Unit-II Acid, Base and Salt & Chemical Bonding **9 Hours**

Arrhenius Theory, Lewis theory and Bronsted-Lowry Theory on Acidity, Basicity & Salts, Concept of strong & weak acids, Strong & weak bases, Acidity, Basicity, Neutralization reaction, concept of pH and pH scale.

Concept of atom and molecule, cause of Chemical Bond, Types of Bonds: Ionic Bond, Covalent Bond & Co-ordinate Bond with example.

Unit-III Electrochemistry & Oxidation-Reduction **9 Hours**

Oxidation and Reduction, Electrolytes, Electrolysis, Arrhenius theory on Electrolysis, Faraday's Laws. Application of electrolysis such asElectroplating, Electro-refining and Electrometallurgy Electrochemical Cells, Primary Cell -Dry Cell, Secondary Cell -Lead storage cell,

Study on I) Caustic Soda II) HCl III) Bleaching Powder IV) Hydrogen Peroxide

Unit-IV Basics of Organic & Polymer Chemistry **9 Hours**

Organic compounds, Tetra Valence Of Carbons, Functional groups, IUPAC nomenclature ,Simple Alkane , Alkene & Alkynes Study on - Aromatic Compounds –Benzene. Polymerisations: Types, Degree of Polymersation, amorphous and crystalline

Unit-V States of Matter & Chemical Kinetics **9 Hours**

Three states of matter, Concept of Latent Heat, Inter Molecular Forces, Introduction of Solid, Gas & Liquid.

Reversible and Irreversible reactions, Exothermic and Endothermic Reactions, Chemical equilibrium, Le Chatelier's Principle, Rate of Reactions, Graphical Study on Reactant and Product, limiting Reagent.

Total **45 Hours**

Text books:

1. Text Book of Chemistry for Class XI & XII (Part-I, Part-II); N.C.E.R.T., Delhi, 2022
2. ISC Chemistry, K.L Chugh, Kalyani Publishers, Ludhiaana, 2022
3. ISC Chemistry,Dr H.C Srivastava, NageenPrakashan Pvt Ltd, Meerut- 250002, UP. 2020
4. Dara,S.S&Dr.S.S.Umare, Engineering Chemistry,S. Chand. Publication, New Delhi, 2020.
5. Jain & Jain, Engineering Chemistry, DhanpatRai and Sons; New Delhi, 2020.

References:

1. All in one Chemistry for class XI & XII, Arihant Pvt Ltd,2022
2. CBSC Chemistry For class XI & XII, Allen Pvt Ltd, 2024
3. Maiti, Tewar& Roy, Chemistry for XI & XII, ChhayaPrakashani Pvt.Ltd.,2024

Course Title	: **APPLIED PHYSICS**					**Semester -III**
Course Code	: **25BS112**	**L**	**T**	**P**	**C**	
Course Category	: **BRIDGE COURSE**	2	1	0	3	

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1	Identify physical quantities, select their units for use in engineering solutions, and make measurements with accuracy by minimizing different types of errors
CO2	Explain Hooke's law and its significance. Explain Newton's laws of Gravitation.
CO3	Define the terms; heat and temperature, measure temperature in various processes on different scales (Celsius, Fahrenheit, and Kelvin etc.).
CO4	Define wave parameters: frequency, amplitude, wavelength, and velocity. Understand the formation of Image by lens.
CO5	State Ohm's law, calculate the equivalent resistance of a variety of resistor combinations. Differentiate between insulators, conductors and semiconductors. Understand the working of NPN & PNP transistor.

Unit-I Physical World, Units and Measurements **9 Hours**

Physical quantities; fundamental and derived units, Units and systems of units (FPS, CGS and SI units), Dimensions and dimensional formulae of physical quantities, Principle of homogeneity of dimensions, Dimensional equations and their applications (conversion from one system of units to other, checking of dimensional equations and derivation of simple equations).

Unit-II Properties of Matter **9 Hours**

Elasticity: Definition of stress and strain, moduli of elasticity, Hooke's law, significance of stress- strain curve.

Newton's laws of Gravitation, Universal Gravitational constant, Acceleration due to gravity and its variation on/ above/ below Earth's surface.

Unit-III Heat and Temperature **9 Hours**

Concept of heat and temperature, modes of heat transfer (conduction, convection and radiation with examples), scales of temperature and their relationship.

Unit-IV Wave Motion and Optics **9 Hours**

Simple Harmonic Motion (definition and example only), Wave motion, transverse and longitudinal waves with examples, definitions of wave velocity, frequency and wave length and their relationship, amplitude, phase, phase difference.

Basic optical laws; reflection and refraction, refractive index, Total internal reflection, Critical angle, Lens and image formation by lens, lens formula, power of lens and magnification.

Samrat

Unit-V Electricity and Electronics **9 Hours**

Electric Current and its units, potential difference, Resistance and its units, series and parallel combination of resistances. Ohm's law and its verification.

Insulator, semi-conductor, conductor, intrinsic and extrinsic semiconductors, p-n junction, junction diode, forward and reverse bias and V-I characteristics, Transistor: description and three terminals, Working of PNP and NPN.

Total **45 Hours**

Text books:

1. Text Book of Physics for Class XI & XII (Part-I, Part-II); N.C.E.R.T., Delhi
2. New Simplified Physics by SlArora for Class XI & XII (VOL-1, VOL-2), DhanpatRai& CO.
3. Concepts of Physics by HC Verma, Vol. I & II, BhartiBhawan Ltd. New Delhi
4. A TEXT BOOK of Optics, N. Subramanyam, BrijLal, MN Avahanulu, S Chand and Company Ltd.
5. Nootan CBSE Board Physics Text Book for Class 11thand 12th, By Kumar-Mittal - NageenPrakashan.

References:

1. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi.
2. Engineering Physics by DK Bhhatacharya&PoonamTandan; Oxford University Press, New Delhi.
3. Modern approach to Applied Physics-I and II, AS Vasudeva, Modern Publishers.
4. Schaum's outline of applied physics / 4th edition by Arthur Beiser.

Diploma in Handloom & Textile Technology

Curriculum & Syllabus (Semester IV)

S No	Course Category	Course Code	Course Title	Hours / week			Total Hrs / week	Credits
				L	T	P		
1	Programme Core	25HTPC209	Weaving Technology - I	3	0	0	3	3
2	Programme Core	25HTPC210	Fabric Structure – II	2	1	0	3	3
3	Programme Core	25HTPC211	Chemical Processing of Textiles -II	3	0	0	3	3
4	Programme Core	25HTPC212	Fibre & Yarn Quality Evaluations	3	0	0	3	3
5	Programme Elective	25HTPE2**	Programme Elective - I	3	0	0	3	3
6	Programme Core	25HTPC213	Fabric Analysis & Costing Laboratory - I	0	0	2	2	1
7	Programme Core	25HTPC214	Weaving Technology Laboratory	0	0	4	4	2
8	Programme Core	25HTPC215	Chemical Processing of Textiles Laboratory – II	0	0	4	4	2
9	Programme Core	25HTPC216	Fibre & Yarn Quality Evaluation Laboratory	0	0	3	3	1.5
10	Internship	25IS201	Internship-I/ Educational Tour	0	0	0	0	2
11	Audit	25AU202	Indian Constitution	2	0	0	2	0
				Total			**30**	**23.5**

Programme Elective

S No	Course Category	Course Code	Course Title	Hours / week			Total Hrs / week	Credits
				L	T	P		
1	Programme Elective	25HTPE201	Traditional Handloom Textiles of India	3	0	0	3	3
2	Programme Elective	25HTPE202	Technological Developments in Handlooms	3	0	0	3	3
3	Programme Elective	25HTPE203	Handcrafted Textile & Handloom Tourism of India	3	0	0	3	3

Course Title	:	**WEAVING TECHNOLOGY – I**				**Semester -IV**
Course Code	:	**25HTPC209**	**L**	**T**	**P**	**C**
Course Category	:	**PROGRAMME CORE**	3	0	0	3

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1	Discuss the concept and mechanism of warp winding and weft pirn winding, & principle of warping and sizing.
CO2	Summarize the working mechanism of primary motions in tappet and dobby loom.
CO3	Elaborate the various beat-up and secondary and warp protector mechanisms in power loom.
CO4	Demonstrate warp and weft stop, multiple box and temple mechanisms in power looms.
CO5	Calculating the winding, warping, sizing and production calculations.

Unit-I Yarn Winding **9 Hours**

Winding: Objectives – Working principle of drum and precession winding machine; Automatic cone winding machine- yarn passage-working principle; Pirn Winding Machines- yarn passage-Working Principle; Package faults & Remedies; Tensioning devices- Additive, multiplicative, additive cum multiplicative; Mechanical yarn cleaner- Slub catcher; Electronic yarn cleaner- Photo-electric and capacitance types; Splicing and Knotting – objectives and types; Ribbon breaking devices – objectives and types Mechanical and Electronic; Yarn winding calculations: cone/pirn winding machines efficiency, wastage and production. (Ne, Denier and Tex systems only)

Unit-II Warping and Sizing **9 Hours**

Warping: Objectives, Modern high-speed beam warping and sectional warping machines- working principles; Sizing- Objectives, Slasher/Multi-cylinder sizing machine - working principle, Defects in sizing- causes and remedies; Sectional warping - Creel capacity, Sections, Patterns per section, Warp width, length of warp, Wastage and total ends. (Ne, Denier and Tex systems only) Sizing – Weight of warp, Beam count, Size pick-up percentage, Production and Efficiency. (Ne, Denier and Tex systems only).

Unit-III Powerloom Weaving **9 Hours**

Introduction to Power looms- Primary, Secondary and Auxiliary motions; Shedding – Objectives-Tappet shedding mechanism - Earlyand Late shedding; Dobby- Objectives- Difference between Single and Double Lift Dobbies, Climax dobby – Mechanism; Picking mechanisms: Objectives – Cone over pick, cone Under pick mechanisms, Parallel mechanism- Working Principle, Early and late picking, advantages and disadvantages; Beat-up: Objective – Mechanism- Sley Eccentricity; Timing/synchronization of primary Motions.

Unit-IV Basic Automation in Power looms **9 Hours**

Secondary Motions: Take-up Motion- Objectives, Seven Wheel Take up Motion- Difference Between 5 and 7 wheel take up motions, Dividend calculations; Negative let-off motions – Objectives, Rope and chain & lever Let-off Motion- working principle; Auxiliary Motions - Warp protector mechanisms- Objectives- Loose and Fast reed motions-Scope-Working principle - advantages and disadvantages; Warp Stop Motions- Objectives-Mechanical and Electrical Motions Scope-Working principle - Advantages and disadvantages.

Unit-V Automatic Power looms **9 Hours**

Weft stop motions: Objectives-Side and Centre weft fork motions- Scope-Working principle - Advantages and disadvantages; Multiple Shuttle Box Motion- Cowburn and Peck's motion; Pick at will motion- objectives; Temples Motion-Objectives - Ring and Roller Temple - Scope-Working principle - Advantages and disadvantages; Fabric Production Calculations- Weight of warp & weft, Production/shift/hour, efficiency, wastage, No of looms, (Ne, Denier and Tex systems only)

Total **45 Hours**

Text books:

7. Marks R. and Robinson T.C., "Principles of Weaving", The Textile Institute, Manchester, 1989.
8. Sabit Adanur, "Handbook of Weaving", Technomic Publishing Co. Inc., 2001.
9. Ormerod A. and Sondhelm W.S., "Weaving: Technology and Operations", Textile Institute, 1995.

References:

5. Talukdar M.K., Sriramulu P.K. and Ajgaonkar D.B., "Weaving: Machines, Mechanisms Management", Mahajan Publishers, Ahmedabad, 1998.
6. Booth J.E., "Textile Mathematics Volume 3", The Textile Institute, Manchester, 1977.
7. Lord P.R. and Mohamed M.H., "Weaving: Conversion of Yarn to Fabric", Merrow, 1992.
8. Mr.Vadivel Volume-II Textile calculations.
9. Vangheluwe L., "Air-Jet Weft Insertion", Textile Progress, Vol. 29, No. 4, Textile Institute Publication, 1999.

Course Title	:	**FABRIC STRUCTURE – II**				**Semester -IV**
Course Code	:	**25HTPC210**	**L**	**T**	**P**	**C**
Course Category	:	**PROGRAMME CORE**	2	1	0	3

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Sketch corded and rib structures using basic weaves.

CO2 Create double cloth structures using different methods.

CO3 Construct treble cloth and backed cloth structures.

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CO4 Select different weaves to produce compound fabric structures.

CO5 Develop the designs for complex fabric structures.

Unit-I Distorted Thread Effects, Corded and Rib Structures 9 Hours

Distorted thread effects- salient feature Warp distortion and weft distortion, Design, draft, denting, Peg plan. Bedford cord weaves – salient features, plain faced Bedford cord (regular and alternate pick principle), twill faced bed ford cord, wadded bed ford cord. Welt & Pique structures – salient features and manufacturing techniques, ordinary structure, wadded structure (loose back and fast back); Difference between welts and piques, Difference between Bedford cord and welt. Design, draft, denting, peg/tie-up plan and thread interlacing diagram of above weaves.

Unit-II Double Layer Cloth and Its Types 9 Hours

Double cloth – classification, Step by step construction of self-stitched double cloth, reversible and non-reversible varieties using twill, sateen and satin; Centre stitched double cloth; double width plain cloth, plain Tubular cloth. Thread interchanging double cloth- warp thread interchanging double cloth ,weft thread interchanging double cloth, Cloth interchanging double cloth using plain and twill weaves; Stripes and check effects using cloth interchanging principle; wadded double cloth – warp wadding and weft wadding. Design, draft, denting, peg/tie-up plan and thread interlacing diagram of above weaves.

Unit-III Treble Cloth and Backed Cloth 9 Hours

Treble width plain cloth – interlacement diagram and its graphical representation; Treble cloth using twill, satin, and sateen. Backed cloths- warp & weft backed cloths-warp wadded and weft wadded backed cloth-Reversible and non-reversible using twill, sateen and satin. Difference between Warp backed and Weft backed Design, draft, denting, peg/tie-up and thread interlacing diagram of above weaves.

Unit-IV Compound Weave Structure Pile Weave 9 Hours

Pile fabrics – Salient features, classification of pile fabrics- loop pile and cut pile; warp pile and weft pile. Terry piles – salient features, terry mechanism; classification of terry pile structures – 3 pick, 4 pick, 5 pick and 6 pick terry, Terry pile on one side of fabric and on both sides- structures, Stripe and Check effect. Graphical representation and thread interlacement diagram. Basic principles and weaves of warp pile fabrics produced with the aid of wires and face to face weaving. Construction of Weft pile designs - Construct Plain back, Twill back pile designs, Corded velveteen- Difference between Velvet & Velveteen Difference between Cut pile & loop pile. Design, draft, denting, peg plan, tie up and thread interlacing diagram of above weaves.

Unit-V **Introduction to Complex Weaves and Jacquard Figured Design** **9 Hours**

Principles of Cross weaving-Various types of sheds formed in cross weaving - Construction of plain gauze & leno – Drafting, lifting plan, thread diagram & graphical representation. Construction of extra warp and extra weft designs -. Difference between extra warp and extra weft. Introduction of Construction and development of jacquard designs. Count of graph paper- Factors influencing the selection of appropriate count of graph paper. Study of Figured single cloth - structure of cloth with different weaves combination-Design development and punching process by using straight tie and straight draft

Total **45 Hours**

Text books:

1. Grosicki Z. J.” Watson’s Textile Design and Color’ ,Vol.1, Woodhead publications, Cambridge England, 2004.
2. Grosicki Z . J.” Watson’s Advanced Textile Design and Color’ ,Vol II, Butterworth Lonon 1989.
3. Grammar of Textile Design by H. NISBET, F.T.I

References:

1. Geormar D. Woven Structure and Design Part I Single Cloth Construction WIRA UK 1986
2. Georner D, “Woven Structure and Design, Part 2: Compound Structures”, WIRA,U.K., 1989.
3. X. Chen,M. Spola,J. Gisbert Paya &P. Mollst Sellabona1,Experimental Studies on the Structure and Mechanical Properties of Multi-layer and Angle-interlock Woven Structures.

Course Title	:	**CHEMICAL PROCESSING OF TEXTILES -II**				**Semester -IV**
Course Code	:	**25HTPC211**	**L**	**T**	**P**	**C**
Course Category	:	**PROGRAMME CORE**	3	0	0	3

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Explain the process of pre-treatments and dyeing of polyester materials, dyeing defects and its remedies.

CO2 Discuss on various methods and styles of printing.

CO3 Describe the recipe and procedure for styles of printing on cotton, silk and polyester.

CO4 Identify various mechanical finishes.

CO5 Explain the recipe and process of various chemical finishing.

Unit-I **Pretreatment and Dyeing Of Polyester** **9 Hours**

Pre-treatment of Polyester: Scouring, bleaching with sodium chlorite. Heat Setting: Objective & Methods. Dyeing of Polyester with Disperse dyes: Mechanism, Recipe, Process conditions with procedure for Carrier, HTHP & Thermosol dyeing. Common Dyeing defects, damages and their remedies.

Unit-II Introduction of Textile Printing **9 Hours**

Definition of Printing: Differences in Dyeing and Printing, Printing paste ingredients and their functions. Methods of printing viz. Block Printing, Screen Printing, Rotary and Flatbed Screen Printing and Preparation of screen by photographic method.. Brief outlines of Styles of Printing viz. Direct, Resist and Discharge Printing. After Treatments in printing: Steaming, Ageing and Curing.

Unit-III Style of Printing **9 Hours**

Direct style of printing of cotton with Direct dyes, Reactive dyes, Pigments: recipe & Procedure. Direct style of printing of Silk with Acid dyes: recipe & Procedure, Direct style of printing of Polyester with Disperse dyes: recipe & Procedure. Discharge style of printing of cotton dyed with Direct dyes. Traditional styles of Printing viz. Tie & dye, Kalamkari and Batik printing.

Unit-IV Introduction and Mechanical Finishes **9 Hours**

Textile Finishing: Objectives and factors affecting selection of finishes. Classification: Mechanical and Chemical Finishes, Temporary and Permanent Finishes. Mechanical Finishing: Calendaring, Sanforizing, Sueding, Raising.

Unit-V Chemical Finishes **9 Hours**

Mercerization, objective, Chemistry, method of mercerization. Wrinkle-resist finishing, Softening, Stiffening, Waterproof, water repellent, soil release, flame retardant finish.

Total **45 Hours**

Text books:

1. Chemical Processing of synthetic fibres and blends, Datye & Vaidya, A Wiley Interscience publication.
2. Technology of Textile Finishing by R. S. Prayag
3. Technology of Textile Printing, R.S.Prayag.

References:

1. Chemical Processing of Textiles by Dr. C.V. Kaushik and Mr. Antao Irwin Josico, NCUTE.
2. Textile Dyeing by Dr. N. N. Mahapatra, Woodhead Publishing India in Textiles.
3. An Introduction to Textile printing by W Clarke.
4. Technology of Textile Finishing by Dr. V.A. Shenai.
5. Chemical Finishing of Textiles by W.D. Schindler and P.J. Hauser.
6. A Handbook of Textile Finishing by A.J. Hall.
7. Principles of Textile Finishing by Asim Kumar Roy choudhury.

Course Title	:	**FIBRE & YARN QUALITY EVALUATIONS**				**Semester -IV**
Course Code	:	**25HTPC212**	**L**	**T**	**P**	**C**
Course Category	:	**PROGRAMME CORE**	3	0	0	3

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Explain the concept of textile quality, dimensions of quality, standardisation, sampling requirements, and fibre identification methods.

CO2 Understand the moisture in textiles, atmospheric conditions; determine moisture content and regain; explain the effect of moisture on fibre and fabric properties.

CO3 Describe fibre quality parameters such as length, fineness, maturity, and strength and interpret their effects on spinning performance.

CO4 Explain yarn count systems and methods, yarn strength using appropriate methods and instruments.

CO5 Explain yarn twist, yarn evenness and hairiness and, their importance on fabric quality.

Unit-I **QUALITY BASICS, SAMPLING & FIBRE IDENTIFICATION** **9 Hours**

Meaning and definition of quality; dimensions of quality; customer satisfaction and its importance in textiles; reasons for textile testing. Standardisation in textile testing - need and purpose of standards; introduction to standard organisations (ISO, BIS, ASTM, AATCC). Sampling in textile testing: importance of sampling; types of samples; sampling methods for fibres, yarn and fabrics.

Identification of textile fibres (Cotton, Viscose, Silk, Wool, Nylon, Polyester and Acrylic fibres only): feeling test; burning test (behaviour towards flame, odour, and ash formation); microscopic identification (longitudinal and cross-sectional views); solubility tests.

Unit-II **ATMOSPHERIC CONDITIONS & MOISTURE RELATIONS** **9 Hours**

Introduction to moisture in textiles: humidity, absolute humidity, and relative humidity; standard testing atmosphere. Measurement of atmospheric conditions - principle and working of wet & dry bulb hygrometers.

Moisture content and Moisture regain: definitions, importance, standard regain values of different fibres; factors affecting moisture regain; effect of moisture on fibres and textile materials. Measurement of moisture content and regain – principle and working of conditioning ovens; simple numerical calculations.

Unit-III FIBRE QUALITY PARAMETERS **9 Hours**

Importance of fibre testing; factors influencing spinning performance. Fibre Length: importance, staple length, mean length, effective length, percentage of short fibres, span length, uniformity ratio; measurement of fibre length parameters using Baer sorter and Digital Fibrograph. Fibre Fineness: importance; definition; methods of measuring fineness of cotton fibres; instruments working on the air flow principle. Fibre Maturity: importance; methods of determination of maturity - caustic soda swelling method.

Fibre strength: importance; elongation, stress and strain; typical stress-strain behaviour of cotton and polyester fibres; definitions of breaking load, breaking elongation and tenacity; principle and methods of measuring strength of single and bundles of fibres; principle and working of stelometer. Fibre Quality Index (FQI) and Spinning Consistency Index (SCI): concept, parameters used and importance in fibre grading.

Unit-IV YARN COUNT AND STRENGTH EVALUATION **9 Hours**

Importance of yarn testing for spinning, weaving, and knitting performance.

Yarn count: direct and indirect systems of yarn count: English (Ne), Metric (Nm), French (Nf), Tex and Denier systems only. Methods of yarn count measurement - wrap reel and balance method; Beesley's balance.

Yarn strength: importance; definitions of terms - work factor, tenacity and work of rupture; factors influencing yarn strength. Principles of tensile strength testing instruments - CRL, CRE and CRT systems (introductory). Principle and working of the single yarn strength tester, the lea strength tester and the Instron tester. CSP (Count–Strength Product): concept and industrial relevance.

Unit-V YARN TWIST, EVENNESS AND HAIRINESS **9 Hours**

Yarn twist: importance; twist directions; twist amount (TPI/TPM); twist multiplier and twist factor; effect of twist on yarn and fabric properties. Twist measurement - principle and working of single and ply yarn twist testers by twist contraction method, straightened fibre methods and untwist method.

Yarn evenness: importance; classification of variation; definitions of U % and CV %; methods of measuring yarn evenness – cutting and weighing, capacitance and photoelectric methods; principle and working of yarn appearance board and winder; Uster evenness tester; causes of yarn irregularity.

Yarn hairiness: importance; effect of yarn hairiness on fabric quality; measurement of yarn hairiness – principle and working of yarn hairiness tester.

Total **45 Hours**

Text books:

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

4. A Practical Guide to Textile Testing, Amutha, K., CRC Press, 2016.

References:

1. Quality Assurance for Textiles and Apparels, Sara J. Kadolph, Fairchild Publications, New York, 1998
2. Physical Testing and Quality Control, Slater K., The Textile Institute, Manchester, 1993
3. Textile testing web course content https://nptel.ac.in/courses/116/102/116102029/#

Course Title	:	**FABRIC ANALYSIS & COSTING LABORATORY – I**				**Semester -IV**
Course Code	:	**25HTPC213**	**L**	**T**	**P**	**C**
Course Category	:	**PROGRAMME CORE**	0	0	2	1

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Analyze weave structure and constructional parameters of plain weave and its derivatives.

CO2 Analyze and differentiate twill, satin, and sateen weaves with respect to weaving techniques.

CO3 Evaluate honeycomb and huck-a-back fabrics based on construction and end-use suitability.

List of Experiments **30 Hours**

1. Analysis of weave, construction parameters and weaving techniques of fabrics with plain weave.
2. Analysis of weave, construction parameters and weaving techniques of fabrics with plain weave derivatives for its production.
3. Analysis of weave, construction parameters and weaving techniques of fabrics with different types of twill weaves and its derivatives for its production.
4. Analysis of weave, construction parameters and weaving techniques of fabrics with satin and sateen weaves for its cloth production.
5. Analysis of weave, construction parameters and weaving techniques of honey comb fabrics.
6. Analysis of weave, construction parameters and weaving techniques of Huck a back fabrics.

Total **30 Hours**

Course Title	:	**WEAVING TECHNOLOGY LABORATORY**				**Semester -IV**
Course Code	:	**25HTPC214**	**L**	**T**	**P**	**C**
Course Category	:	**PROGRAMME CORE**	0	0	4	2

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Develop complex weave handloom fabric samples using multi-treadle looms, advanced weaves, and dobby designs for apparel applications.

CO2 Analyze material passage, production calculations, and winding systems involved in pattern warping and yarn preparation processes.

CO3 Demonstrate erection, setting, and functional understanding of power loom mechanisms related to shedding, picking, beat-up, let-off, and take-up systems.

List of Experiments **60 Hours**

1. Development of samples on Multi Treadle Looms with basic weaves with design, draft and peg plan- Distorted thread effect, Bedford cord, Welt & Pique, Double cloth, thread interchanging double cloth, weft & warp backed, Treble cloth, Terry weaves, Leno.
2. Creation of designs suitable for saree borders and dhoti borders using handloom dobbies.
3. Study the material passage and production calculation for Pattern warp in sectional warping machine.
4. Study the material passage, setting of tensioner, slub catchers in cone and pirn winding machines.
5. Sketching and acquiring knowledge of different functional parts of Power loom.
6. Practice of erection and setting of tappet shedding mechanism.
7. Practice of erection and setting of over-pick and under-pick mechanisms
8. Practice of erection and setting of beat-up mechanism and control of Sley eccentricity.
9. Practice of erection and setting of 5 and 7 wheel take-up mechanisms.
10. Study of let-off mechanisms.
11. Study of weft fork and weft replenishment mechanisms in shuttle looms
12. Study of warp Protector mechanism- Loose reed and Fast Reed
13. Study of Warp Stop mechanism.
14. Study of Drop Box mechanism.
15. Study of Cop Changing mechanism.

Total **60 Hours**

Course Title	:	**CHEMICAL PROCESSING OF TEXTILES LABORATORY – II**				**Semester -IV**
Course Code	:	**25HTPC215**	**L**	**T**	**P**	**C**
Course Category	:	**PROGRAMME CORE**	0	0	4	2

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Perform dyeing of natural, synthetic, and blended fabrics using appropriate dye classes and methods.

CO2 Execute textile printing techniques including block, screen, discharge, tie-dye, and batik styles.

CO3 Identify dyes, apply functional finishes, and evaluate colour using CCM and colour measurement

List of Experiments **60 Hours**

1. Dyeing of polyester with disperse dyes using HTHP and carrier method.
2. Dyeing of Polyester/Cotton blends with Disperse/Reactive dyes.
3. Printing of Cotton in direct style with Reactive dyes using Blocks & Screens.
4. Printing of Polyester in direct style with Disperse dyes using Blocks & Screens.
5. Printing of Cotton & Polyester in direct style with Pigment Colours using Blocks & Screens.
6. Printing of silk in direct style with acid or metal complex dyes.
7. Printing of Cotton in White Discharge Style on Direct & Reactive dyed ground using blocks & screens.
8. Printing of cotton in colour discharge style on direct dyed ground using block & screens.
9. Tie & Dye style of printing
10. Batik style of printing.
11. Identification of dyes in powder form or dyed material.
12. Application of Anti-crease finish on cotton.
13. Application of Softeners
14. Demonstration on Computer Colour Matching.
15. Calibration, K/S Data generation & Evaluation of whiteness/yellowness index.

Note: Minimum 12 experiments to be performed.

Total **60 Hours**

Course Title	:	**FIBRE & YARN QUALITY EVALUATION LABORATORY**				**Semester -IV**
Course Code	:	**25HTPC216**	**L**	**T**	**P**	**C**
Course Category	:	**PROGRAMME CORE**	0	0	3	1.5

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Identify textile fibres and evaluate basic fibre properties such as moisture content, moisture regain, length, fineness, maturity, and blend composition using standard test methods.

CO2 Determine yarn characteristics including yarn count, resultant count, twist and fabric yarn count using laboratory instruments.

CO3 Assess yarn quality through strength testing, CSP evaluation, evenness, and appearance grading, and interpret results for quality control applications.

List of Experiments **45 Hours**

1. Identification of textile fibres using physical and chemical analysis: microscopic test, burning test and solubility test.
2. Determination of blend composition of the given sample (fibre - yarn - fabric) of cotton, polyester, viscose, nylon, acrylic and their blends (at least two components)
3. Determination of moisture regain and moisture content of the given material & computation of commercial weight as per standards.
4. Determination of mean length, effective length and percentage of short fibres of the given cotton fibres using the Baer sorter method.
5. Determination of fibre fineness of cotton using the airflow method.
6. Determination of fibre denier of a given multifilament yarn sample using the length-weight method and conversion into Tex / Ne.
7. Determination of the maturity coefficient of a given cotton sample.
8. Determination of the hank of the given sliver and roving using the wrap block.
9. Estimation of the count of yarn in Ne using the wrap reel and physical balance, and conversion of yarn count into Tex/Denier.
10. Determination of resultant count of given plied yarn using the length & weight method.
11. Determination of lea strength and CSP of the given yarn sample using the wrap reel and the Lea strength tester.
12. Determination of the count of warp and weft yarn of a given fabric sample using Beesley's Balance. (Ne & Tex).
13. Determination of twist direction & twist amount (TPI/TPM) of a given single yarn sample using the twist contraction method.
14. Determination of twist direction & twist amount (TPI/TPM) of given ply yarn sample.
15. Determination of yarn appearance grade by visual assessment using ASTM Yarn Appearance Boards.

Note: Minimum 12 experiments to be performed.

Total **45 Hours**

Course Title	: **INDIAN CONSTITUTION**					**Semester -IV**
Course Code	: **25AU202**	**L**	**T**	**P**	**C**	
Course Category	: **AUDIT**	2	0	0	0	

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Explain the meaning, historical evolution, and key features of the Indian Constitution, including Fundamental Rights, Fundamental Duties, and Directive Principles of State Policy.

CO2 Explain the structure and functioning of the Union Government.

CO3 Understand the role and powers of State Government authorities.

CO4 Explain the functioning of Local Administration and Panchayati Raj Institutions.

CO5 Describe the role and importance of the Election Commission in India.

Unit-I Introduction to the Constitution **6 Hours**

The constitution -introduction, the history of the making of the Indian constitution preamble and the basic structure, and its interpretation, fundamental rights and duties and their interpretation, state policy principles.

Unit-II Union Government **6 Hours**

Structure of the Indian Union- President – Role and powers- Prime Minister and Council of Ministers – Parliament – Lok Sabha and Rajya Sabha.

Unit-III State Government **6 Hours**

Structure of State Government- Governor – Role and powers- Chief Minister and Council of Ministers – State Secretariat.

Unit-IV Local Administration **6 Hours**

Local administration, district administration, municipal corporation, zillah panchayat.

Unit-V Election System in India **6 Hours**

Election commission, role and functioning, chief election commissioner, state election commission

Total **30 Hours**

Text books:

1. Introduction to the Constitution of India – D.D. Basu
2. Indian Constitution – M. Laxmikanth (Student Edition)
3. Our Constitution – Subhash Kashyap

References:

1. The Constitution of India – P.M. Bakshi
2. Indian Polity for Beginners (Diploma Students Edition) – Publications Division
3. Ethics and Politics of the Indian Constitution – Rajeev Bhargava
4. https://www.legislative.gov.in/constitution-of-india
5. https://www.india.gov.in
6. https://www.eci.gov.in (Election Commission of India)
7. https://www.toppr.com/guides/civics

Course Title	:	**TRADITIONAL HANDLOOM TEXTILES OF INDIA**				**Semester -IV**
Course Code	:	**25HTPE201**	**L**	**T**	**P**	**C**
Course Category	:	**PROGRAMME ELECTIVE - I**	3	0	0	3

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1	Identify & Recognize the raw materials, production techniques, and unique characteristics of major Indian handloom sarees.
CO2	Gain knowledge of regional handloom sarees and shawls, their weaving techniques, materials, and design features.
CO3	Categorize the product specifications, materials, and weaving techniques of selected handloom textiles including towels and gamcha. Recognize
CO4	Understand the objectives, benefits, procedures, and role of organizations (DCH, WSC, Textiles Committee) in handloom certification and quality marks.
CO5	Recognize the legal framework, reserved articles, enforcement powers, and penalties under the Handloom Act to protect handloom production.

Unit-I Traditional Indian Handloom Sarees 9 Hours

Product specifications, production techniques, raw material, and unique characteristics of: Banaras Brocade Silk Saree, Baluchari Silk Saree, Bomkai Saree, Chanderi Saree, Chettinad Cotton Saree, Gadwal Saree, Iikal Saree, Jamdani Cotton Saree.

Unit-II Traditional Indian Sarees and Shawls 9 Hours

Product specifications, production techniques, raw material, and unique characteristics of: Kota Doria Saree, Khandua Saree, Kani Pashmina Shawl, Kancheepuram Silk Saree, Maheswari Saree, Mangalgiri Saree, Paithani Saree, Pochhampally Ikat Saree, Siddipet Gollabama Saree, Sambalpuri Saree.

Unit-III Traditional Indian Handloom Sarees, Towels and Gamcha 9 Hours

Product specifications, production techniques, raw material, and unique characteristics of: Shantipuri Cotton Saree, Tangail Cotton Saree, Tanchoi Silk Saree, Uppada Jamdani Silk Saree, Venkatgiri Cotton Saree, Balaramapuram Cotton Saree, Erazhatotthu Towel, Gamcha.

Unit-IV Handloom Certification and Quality Marks **9 Hours**

India Handloom Brand (IHB): Objectives, benefits, standard operating procedure, detailed procedure on surveillance-certificate of registered trademark. Role of Office of DCH, Weaver's Service Centres, and Textile Committee on IHB. Handloom Mark: Objectives, details of schemes. Silk Mark: Objectives, details of scheme. Introduction to Global Organic Textile Standard (GOTS).

Unit-V Reserved Articles and Enforcement **9 Hours**

The Handloom (Reservation of Articles for Production) Act, 1985: Terms and definitions; Range reserved for exclusive production by handlooms; Power to specify articles for exclusive production by handlooms; Constitution of advisory committee; Prohibition of production of articles reserved for exclusive production by handlooms; Power to call information, inspection, search and seize; Penalty for contravention.

Total **45 Hours**

Text books:

1. John Gillow, Nicholas Barnard, "Traditional Indian Textiles".
2. Anjali Karolia, "Traditional Indian Handcrafted Textiles: History, Techniques, Processes, and Designs Vol. I & II".

References:

1. The Handloom (Reservation of Articles for Production) Act, 1985, No. 22 of 1985
2. https://www.indiahandloombrand.gov.in/
3. http://sbscacademic.nic.in/web material/Curriculum/Vocational/2015/Traditional India Textile and Basic Pattern Dev XII/CBSE Traditional Indian Textiles%20XL.pdf

Course Title	:	**TECHNOLOGICAL DEVELOPMENTS IN HANDLOOMS**				**Semester -IV**
Course Code	:	**25HTPE202**	**L**	**T**	**P**	**C**
Course Category	:	**PROGRAMME ELECTIVE - I**	3	0	0	3

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Explain recent developments in handloom preparatory processes.

CO2 Explain recent developments in handloom structural improvements.

CO3 Describe modern take-up motions, dobby mechanisms, and advanced shedding systems in handlooms.

CO4 Illustrate solid border, twin cloth, and jacquard weaving techniques used in handloom production.

CO5 Identify semi-automatic handlooms and evaluate lifting mechanisms and attachments for improved efficiency.

Unit-I Developments in Handloom Preparatory Processes 9 Hours

Objectives of Technological developments in handlooms- the layout of placing the looms in systematic / organized way and its merits and demerits – Limitations of Hand operated pirn, cheese and bobbin winding charkas used in preparatory processes. Advantages of single spindle and multi spindle winding machines over hand operated charkas.

Unit-II Developments in Handloom Structure 9 Hours

Importance of Angle iron pillars and cross bars used in place of wooden pillars and cross bars in pit looms - Power operated in-house beaming machine for long length of warp and its advantages- Improved Frame loom and its advantages.

Unit-III Developments in Take-Up Motions and Handloom Dobbies 9 Hours

5 wheel take up motion and worm & worm wheel take up motions used in handlooms - Drop box or vibrating box attachments on handlooms - Vertical Handloom dobby - Its merits and demerits. Plunger mechanism used in Durry weaving and its advantages.

Unit-IV Solid Border and Twin Cloth Weaving 9 Hours

Weaving on handlooms with multiple jacquards - Solid border weaving with catch cord technique – Solid border weaving sley - Multiple butta weaving sley - Advantages and disadvantages of these mechanisms. Twin cloth weaving sley. Improved pit loom.

Unit-V Semi-Automatic Handlooms and its Attachments 9 Hours

Semi-automatic looms – Nepali pedal loom, Chittaranjan loom, banaras semi-automatic loom, itchalkaranchi loom – Electric motor operated jacquard lifting mechanism, Pneumatic lifting mechanism for jacquard. Electromagnetic lifting mechanism for heald shaft – Merits and demerits of these mechanisms

Total 45 Hours

Text books:

1. A. R. Marks & A. T. C. Robinson – Principles of Weaving, CBS Publishers & Distributors, New Delhi – 2006.
2. V. Subramaniam – Handloom Technology, S. S. M. Publishers, Coimbatore – 2002
3. Mamidipudi, Annapurna & Bijker, Wiebe. (2018). Innovation in Indian Handloom Weaving. Technology and Culture. 59. 509-545. 10.1353/tech.2018.0058.
4. William Watson – Textile Weaving and Design, Longman Group Ltd., London – 2001

References:

1. A. N. Choudhury – Woven Textile Design, Wiley Eastern Limited, New Delhi – 1990
2. R. L. Panjwani – Introduction to Textile Weaving, Textile Association (India), Mumbai – 1998
3. http://textilescommittee.nic.in/sites/default/files/coursecontent/Dobby%20Handloom%20Weaver.pdf

Course Title	:	**HANDCRAFTED TEXTILE & HANDLOOM TOURISM OF INDIA**				**Semester -IV**
Course Code	:	**25HTPE203**	**L**	**T**	**P**	**C**
Course Category	:	**PROGRAMME ELECTIVE - I**	3	0	0	3

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1	Introduce students to India's rich handloom and handicraft heritage and its importance in cultural identity and traditional knowledge systems.
CO2	To understand handloom and handicraft clusters as cultural tourism resources and community-based livelihood systems.
CO3	To study the role of crafts in cultural, heritage, and rural tourism, and their contribution to sustainable development.
CO4	To equip students with knowledge of government schemes, policies, and institutions supporting craft and textile tourism.
CO5	To develop skills to design tourism products such as craft trails, workshops, village experiences, exhibitions, and festivals.

Unit-I Introduction to Tourism & Cultural Heritage 9 Hours

Concepts of tourism: Tourism- NEWS- cultural heritage- rural and urban.Importance of crafts, textiles, and artisan communities in cultural tourism; Overview of India's cultural diversity and heritage resources.

Unit-II Handloom & Handicraft Heritage of India - NEWS 9 Hours

Overview of major handicraft and handloom traditions in NEWS; Regional diversity in fibres, colours, motifs and techniques; Study of major clusters: Banaras, Kanchipuram, Chanderi, Kutch, Kashmir, Assam, Maheshwar, Pochampally and ilkal; GI products and their importance in cultural identity; Role of artisans, cooperatives, SHGs, and craft communities.

Unit-III Handloom & Handicrafts as Tourism Products 9 Hours

Characteristics of craft-based tourism products: authenticity, uniqueness, craftsmanship; Loom-shed visits-Artisan demonstrations-Hands-on workshops (dyeing, weaving, block printing, embroidery)-Craft trails, textile museums, melas, fairs, fashion events-Tourist motivations and expectations; Linking crafts to tourism circuits and storytelling

Unit-IV Policies, Schemes & Institutional Support 9 Hours

Institutions: Ministry of Textiles, DC Handlooms, DC Handicrafts, Tourism Dept., ITDC; Key schemes: Handloom Cluster Development, Marketing Assistance, Craft Villages

Unit-V Sustainable Tourism, Product Development & Entrepreneurship 9 Hours

Responsible tourism practices: fair wages, eco-friendly production, community participation; Sustainable development goals (SDGs) and craft tourism; Learn traditional techniques, observe live demonstrations (handloom village visit 3-4 day itineraries); Basics of branding & marketing: digital promotion and packaging; Visitor management, safety, pricing, logistics, seasonality

Total 45 Hours

Text books:

1. G. K. Goswami – Tourism & Cultural Heritage of India, Oxford University Press, New Delhi, 2012
2. Jaya Jaitly – Handmade in India, Mapin Publishing, Ahmedabad – 2013
3. Rita Kapur Chishti & Martand Singh – Saris of India, Harry N. Abrams, New Delhi – 2010
4. Government of India – Handloom and Handicrafts of India, Ministry of Textiles, Delhi – 2019.

References:

1. World Tourism Organization (UNWTO) – Sustainable Tourism for Development, UNWTO Publications, Madrid – 2018
2. R. P. Sharma – Tourism Development and Management, Kanishka Publishers, New Delhi – 2011

Diploma in Handloom & Textile Technology

Curriculum & Syllabus (Semester V)

S No	Course Category	Course Code	Course Title	Hours / week			Total Hrs / week	Credits
				L	T	P		
1	Programme Core	25HTPC301	Weaving Technology - II	3	0	0	3	3
2	Programme Core	25HTPC302	Garment Manufacturing Technology	3	0	0	3	3
3	Programme Core	25HTPC303	Fabric & Garment Quality Evaluation	3	0	0	3	3
4	Programme Core	25HTPC304	Advances in Textile Processing	3	0	0	3	3
5	Programme Elective	25HTPE3**	Programme Elective - II	3	0	0	3	3
6	Programme Core	25HTPC305	Jacquard Weaving & Computer Aided Textile Designing Laboratory	0	0	4	4	2
7	Programme Core	25HTPC306	Fabric & Garment Quality Evaluation Laboratory	0	0	3	3	1.5
8	Programme Core	25HTPC307	Garment Manufacturing Technology Laboratory	0	0	4	4	2
9	Projects	25PR301	Mini Project	0	0	4	4	2
10	Internship	25IS301	Internship – II	0	0	0	0	3
11	Audit	25AU301	Soft Skills & Personality Development	2	0	0	2	0
				Total			**32**	**25.5**

Programme Elective

S No	Course Category	Course Code	Course Title	Hours / week			Total Hrs / week	Credits
				L	T	P		
1	Programme Elective	25HTPE301	Advances in Spinning Systems	3	0	0	3	3
2	Programme Elective	25HTPE302	Knitting Technology	3	0	0	3	3
3	Programme Elective	25HTPE303	Nonwoven Technology	3	0	0	3	3

Course Title	:	**WEAVING TECHNOLOGY – II**				**Semester - V**
Course Code	:	**25HTPC301**	**L**	**T**	**P**	**C**
Course Category	:	**PROGRAMME CORE**	3	0	0	3

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Discuss the features of jacquard loom and its types.

CO2 Explain the function of each element in projectile and rapier weaving machine.

CO3 Summarize the working principle and weft insertion cycle of jet looms.

CO4 Estimate the yarn diameter and cover factor of fabric sample.

CO5 Analyze the fabric in terms of warp and weft threads / unit length, GSM related calculations.

Unit-I Jacquards **9 Hours**

Jacquards- Objectives- Functions - figuring capacities & Types, shed formations - Working Principle of SLSC, DLSC, DLDC jacquards -merits demerits. Harness Building- Objectives-Types- London & Norwich; Harness ties -straight, pointed, sectional, mixed tie; Casting out. Electronic Jacquards- Objectives- Functions-Design formation -Advantages. Special Jacquards- Objectives of Cross Border, Damask, Leno, Inverted Hook Jacquard; Functions- Cross Border and Damask jacquard -working Principle -Advantages and disadvantages.

Unit-II Shuttleless Weaving Machines **9 Hours**

Shuttleless Looms: Introduction, Objectives, Types, Speed, Weft insertion techniques, Supply packages, accumulator, measuring systems, cutters and automation in selvedge formation, quick style change, merits & demerits. Projectile looms - Working principle - Weft Insertion - merits & demerits. Rapier Looms- Working principle - Types-weft insertion (Tip & loop Transfer) - merits, demerits.

Unit-III Jet Looms **9 Hours**

Jet Looms- Objectives- Air jet looms -Weft Insertion-working principle- merits demerits. Water Jet looms-Weft Insertion-working principle- merits demerits. Multiphase looms- Principle- circular weaving machines- Weft insertion- merits demerits.

Unit-IV Yarn Diameters and Fabric Cover Calculations **9 Hours**

Pierce's formula for estimation of yarn diameter; Relative diameter of yarns; Cloth Cover calculations: warp cover, weft cover, cloth cover; Fractional cover, Percentage cover, Cover factor. Determination of ends per inch (EPI) & picks per inch (PPI) while changing count, weave, or both to maintain compactness.

Unit-V Fabric Calculations **9 Hours**

Determination of warp & weft count, EPI & PPI while increasing/decreasing fabric weight to maintain compactness. Cloth calculation- weight of warp & weft per linear meter, weight per square meter (GSM), using direct, indirect, and universal systems of yarn count.

Total **45 Hours**

Text books:

1. Marks R. and Robinson T.C., "Principles of Weaving", The Textile Institute, Manchester, 1989.
2. Sabit Adanur, "Handbook of Weaving", Technomic Publishing Co. Inc., 2001.
3. Ormerod A. and Sondhelm W.S., "Weaving: Technology and Operations", Textile Institute, 1995.
4. Mr.Vadivel Textile Calculations Volume-III.

References:

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

Course Title	:	**GARMENT MANUFACTURING TECHNOLOGY**				Semester - V
Course Code	:	**25HTPC302**	**L**	**T**	**P**	**C**
Course Category	:	**PROGRAMME CORE**	3	0	0	3

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1	Identify the structure, functions, and workflow of the garment industry and explain the complete sequence of garment manufacturing operations.
CO2	Take body measurements and draft basic patterns by following the principles of drafting.
CO3	Perform marker planning, spreading and cutting of garment components using suitable machines.
CO4	Identify common sewing machines and Needles for the suitable fabrics.
CO5	Handle different trims and accessories and select suitable ornamentation techniques for the garment.

Unit-I Introduction to Garment Industry **9 Hours**

Overview of Apparel Sector: Role of garment industry in textile value chain - Structure of apparel industry: Domestic vs. Export sector - Classification of garment categories (men's, women's, kids', ethnic wear, handloom-based garments); Garment Production Processes: Pre-production, production, and post-production flow; Departmental Functions – Sampling – Merchandising – Production - Quality Assurance - Finishing & Packing.

Unit-II Pattern Making **9 Hours**

Concepts of basic pattern making: types of pattern making, pattern making tools and its applications, sequence of taking body measurements. Basic concepts of pattern grading and Draping. Basic garment components: functions, features and types – Plackets, Pockets, Collars, Cuffs and Sleeves. Basic pattern drafting- drafting of basic blocks.

Unit-III Marker Planning, Spreading and Cutting **9 Hours**

Marker Planning & Fabric Spreading: marker planning - marker efficiency - Factors to be considered while spreading, methods of spreading: Hand spreading - Machine spreading; lays – Types (Single ply lay , Multiple ply lay, Straight lay, Stepped lay); Fabric Cutting : Importance – Methods - Hand shears (scissors) - Straight knife cutter - Band knife cutter - Round knife cutter; Special Cutting Equipment – Notchers – Drills –Thread making machines – Basic Idea: Computer controlled cutting machine – Die Cutting – laser cutting.

Unit-IV Sewing Essentials **9 Hours**

Classification of Stitches and Seams, Introduction to Sewing Needles: its types, size and their application. Classification of Sewing machines: Parts, Functions and working of Single needle lock stitch machine – Overlock machine – Flatlock machine - Buttonhole & Button sewing machine. Basic note on Computerized embroidery machine.

Unit-V Surface Trims, Accessories and Ornamentation **9 Hours**

Common trims: Functions and types of Sewing thread, buttons, zippers, Velcro, Hook and Eye, labels, linings, interlinings, elastic and lace.Accessories: Collar stand, Carton, Hanger, Backboard, Neckboard, collar stays, Butterfly, Patch, Price ticket, Polybag, Tissue paper, Size strip, Plastic Clip. Introduction to surface ornamentation – Embroidery: Basic hand embroidery stitches, introduction to traditional embroidery - Patch work- Applique- bead work- piping-Zardosi.

Total **45 Hours**

Text books:

1. Carr and Latham's Technology of Clothing Manufacture, Revised by David J.Tyler, Fourth Edition, Blackwell Publishing.
2. T. Karthik, P. Ganesan& D. Gopalakrishnan, Clothing Technology, Woodhead India
3. K.R. Gulati, Sewing Techniques and Processes, New Age Publishers.
4. Gerry Cooklin, Introduction to Clothing Manufacture, Second Edition, Wiley Blackwell.

References:

1. RajkishoreNayak& Rajiv Padhye, Garment Manufacturing Technology, Woodhead Publishing
2. Ruth E. Glock& Grace I. Kunz, Apparel Manufacturing: Sewn Product Analysis, Prentice Hall.
3. Sadhan Chandra Ray, Fundamentals of Garment Manufacturing, CRC Press.
4. Pattern Making for Fashion Design, Helen Joseph Armstrong, Pearson.

Course Title	:	**FABRIC & GARMENT QUALITY EVALUATION**				**Semester - V**
Course Code	:	**25HTPC303**	**L**	**T**	**P**	**C**
Course Category	:	**PROGRAMME CORE**	3	0	0	3

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Explain the structural and mechanical properties of woven and knitted fabrics and their influence on fabric performance.

CO2 Evaluate surface and aesthetic properties of fabrics such as stiffness, drape, crease recovery, abrasion and pilling using standard test methods.

CO3 Assess dimensional stability and colour fastness properties of fabrics as per standard testing procedures.

CO4 Analyse garment component performance including seam strength, seam efficiency, sewing threads, zippers, elastics and fasteners.

CO5 Apply inspection systems, AQL concepts and quality control procedures in garment manufacturing and finishing processes.

Unit-I Structural and Mechanical Properties 9 Hours

Introduction to structural properties of woven and knitted fabrics - basic terms, definitions and measurements: EPI/ PPI, warp and weft yarn count, cover factor, warp, and weft yarn crimp in woven fabrics - Courses per inch, Wales per inch, loop length, stitch density and tightness factor in knitted fabrics. Fabric length, weight, areal density (GSM) measurement, and basic calculations. Principle and measurement of fabric thickness. Mechanical properties and their importance in utility performance; Tensile strength measurement – types of fabrics require tensile strength test - principle and working of tensile strength tester – specimen preparation for ravelled strip test and grab test methods; Tear strength measurement - types of fabrics require tear tests –principle and working of Elemendorf tester; Bursting strength measurement.

Unit-II Surface, Aesthetic and Comfort Properties 9 Hours

Fabric stiffness - concept, importance, principle and measurement using Shirley stiffness tester. Fabric drape - definition, importance, and measurement of drape coefficient. Crease resistance and crease recovery – principle and working of crease recovery tester; Brief introduction to comfort properties - concept and types of comfort, air permeability and measurement of airflow, moisture transmission, wicking behaviour, and their importance. Abrasion resistance - concept, classification, and testing of abrasion resistance. Pilling resistance - factors responsible for pilling, effects of pilling and working of ICI pill box tester.

Unit-III End-Use Specific and Performance Properties 9 Hours

Dimensional stability of fabrics - shrinkage and stretch during laundering. Colour fastness properties – standard tests and evaluation methods for washing, rubbing (dry & wet), perspiration and light fastness. Safety-related properties - importance of flammability testing. End-use specific requirements of fabrics for sportswear, kid's wear and home textiles.

Unit-IV Garment Testing & Component Evaluation 9 Hours

Seam strength testing - purpose and importance; methods of seam strength testing; factors affecting seam strength; seam efficiency; seam puckering and seam appearance evaluation; seam slippage; needle cut index. Testing of zippers – zippers performance evaluation tests. Sewing thread - quality parameters and testing. Properties of elastic waistband – elastic stretch and recovery - quality parameters. Buttons and snap fasteners - button pull test. Introduction to interlining and Velcro evaluation. Basic introduction to OEKO-TEX, GOTS and REACH standards.

Unit-V Inspection and Quality Control in Garment Industry 9 Hours

Introduction to inspection and its importance in garment quality assurance. Stages of inspection; Four-point system for fabric inspection. Assessment of pattern and spreading (lay) - common mistakes in pattern, spreading and marker plan. Cutting room quality parameters - defects in cut pieces. Garment defects during stitching, seaming and assembly. Care labelling and consumer information; Packing quality requirements and checklist. Final inspection and Acceptable Quality Level (AQL) - concept, sampling plans, inspection level, procedure, and inspection reports.

Total 45 Hours

Text books:

1. Principle of Textile Testing, Booth J.E., Butterworth Publications, London, 1989
2. Physical Testing of Textiles, Saville B.P., Textile Institute, Manchester, 1998
3. Testing and Quality Management, Progress in Textile Technology Vol 1, Kothari V. K., IAFL Publications, New Delhi, 1999
4. A Practical Guide to Textile Testing, Amutha, K., CRC Press, 2016.
5. Managing Quality in the Apparel Industry, Pradip V. Mehta., NIFT Publication, India, 1998

References:

1. Advanced characterization and testing of textiles, Dolez, P. I., Vermeersch, O., & Izquierdo, V. (Eds.), Woodhead Publishing, (2017). Apparel Manufacture - Sewn Product Analysis, Ruth Clock and Grace Kunz, Upper Sadle River Publications, New York, 2000
2. Quality Assurance for Textiles and Apparels, Sara J. Kadolph., Fair child Publications, NY 1998
3. Physical Testing and Quality Control, Slater K., The Textile Institute, Manchester, 1993
4. Garment Manufacturing: Processes, Practices and Technology, Prasanta Sarkar, OCS, 2015 (www.onlineclothingstudy.com)
5. Textile testing web course content https://nptel.ac.in/courses/116/102/116102029/#

Course Title	:	**ADVANCES IN TEXTILE PROCESSING**				**Semester - V**
Course Code	:	**25HTPC304**	**L**	**T**	**P**	**C**
Course Category	:	**PROGRAMME CORE**	3	0	0	3

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Describe the application of enzyme in textile wet processing.

CO2 Explain the combined processing and processing of blends.

CO3 Appraise on various special prints and concept of digital printing.

CO4 Discuss on advancement in textile finishing and garment processing.

CO5 Explain the concept of eco-friendly processing and ETP.

Unit-I Enzymes in Textile Processing **9 Hours**

Introduction – Enzymes-mechanism of enzyme action, Factors affecting efficiency of enzyme treatment.Use of enzymes in Pre-treatments – Enzymatic desizing, enzymatic degumming, enzyme scouring, enzymatic bleaching. Finishing – Bio finishing and Use of enzymes in Denim washing. Merits and Demerits of enzyme processing.

Unit-II Pretreatment and Dyeing **9 Hours**

Working of Pre-treatment Range used for continuous scouring and Bleaching. Introdcution to Low Salt and Low Alkali Exhaust control Reactive Dyeing. Pad- Batch and Pad-Dry-Pad-Steam Dyeing Range. Process sequence for Pre-treatment and dyeing of blends: Polyester/Wool, Polyester/Cotton, Polyester/Viscose and Cotton /spandex.

Unit-III Advances in Dyeing and Printing **9 Hours**

Introduction to Digital Printing – principle, methods, advantages and disadvantages.Brief introduction – Brasso, Kadi, Metallic, Foam printing, Flock printing, crepon style and Laser printing. Transfer Printing : methods with their merits and demerits.

Unit-IV Finishing and Garment Processing **9 Hours**

Concept and application of Zero formaldehyde resins for anti-crease finish, foam finishing, aroma finish and liquor ammonia mercerization, UV protection and antimicrobial finish. Introduction, Definition, concept and End use of: nanotechnology, plasma technology, micro-encapsulation and ultrasonic.aGarment processing - Introduction, factors to be considered and garment dyeing machinery used with advantages and disadvantages.

Unit-V Pollution and Effluent Management in Textile Processing **9 Hours**

Pollution in textiles-Introduction, textile pollutants, banned dyes, harmful chemicals, alternative to banned dyes and chemicals. Brief Introduction to natural dyes. Characteristics of waste water, Effluent treatment – methods, design and working of ETP and tolerance level of effluent.

Samrat

Total **45 Hours**

Text books:

1. Chemical technology in the pre-treatment processes of textiles – S.R.Karmakar, Elsevier, 1999.
2. Chemical Finishing of Textiles by W.D. Schindler and P.J. Hauser.
3. Fundamentals and practices in colouration of Textiles, J.N.Chakraborty, Woodhead Publishing.

References:

1. Handbook of Textile processing machinery – R.S. Bhagwat1999.
2. Textile Printing – R.S.Prayag.
3. Digital Printing of Textiles, Ujiie. H. Woodhead publishing,2006.
4. Technology of Dyeing – V.A.Shenai
5. Garment Finishing & Care Labelling by S.S.Satsangi, Usha Publishers, 53-B/ACIV, Shalimar Bagh, New Delhi.
6. Technology of Textile Finishing by R. S. Prayag
7. Textile Processing with Enzymes, A.Cavaco-Paul and G.M.Gubitz, CRC press.
8. Textile Printing,LeslieW.C.Miles.
9. Treatment of Textile Processing of Effluents, M.Manivasakam, Sakthi publications.

Course Title	:	**JACQUARD WEAVING & COMPUTER AIDED TEXTILE DESIGNING LABORATORY**				**Semester - V**
Course Code	:	**25HTPC305**	**L**	**T**	**P**	**C**
Course Category	:	**PROGRAMME CORE**	0	0	4	2

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Develop manual designs of simple and compound fabrics on jacquard weaving machines.

CO2 Practicing on card cutting, lacing and weaving of simple and compound structures & Jala.

CO3 Develop Textile designs, Modify vector image to raster image using by using designing software.

List of Experiments **60 Hours**

1. Sketching and acquiring knowledge of different functional Jacquard parts.

2. Construction of Harness Building- Straight, Pointed Tie, Body and Border Tie and Compound Tie.

3. Design development on Graph paper for Single cloth, double cloth- 2 color and 4 color effect, Extra Warp and Weft, Backed Cloth, Tapestry, Pique, Patent Satin.

4. Punching Procedure for 200 and 400 Hook jacquard on hand punching / piano card Cutting Machine.

5. Punching Procedure for Single cloth, double cloth- 2 colors and 4 color effect, Extra Warp and Weft, Backed Cloth, Tapestry, Pique, Patent Satin.

6. Lacing of pattern cards and weaving.

7. Preparation of Jala.

8. Introduction of computer application in textile designing , fundamental , different methods and advantage of CATD , basic of computer designing , color and color palette, Pixel resolution and its relation with threads and threads per inch , vector and Raster images, different drawing tools.

9. Creation of jacquard furnishings and saree designs by using CATD software.

Total **60 Hours**

Course Title	:	**FABRIC & GARMENT QUALITY EVALUATION LABORATORY**					**Semester -V**
Course Code	:	**25HTPC306**	**L**	**T**	**P**	**C**	
Course Category	:	**PROGRAMME CORE**	0	0	3	1.5	

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Determine and interpret fabric structural and dimensional parameters such as yarn density, crimp, GSM, thickness, shrinkage, and cover factor.

CO2 Evaluate fabric performance characteristics including strength (tensile, tearing, bursting), comfort related properties (air permeability, wicking, stiffness, drape) and surface characteristics such as abrasion and pilling.

CO3 Assess colour fastness properties and garment seam quality parameters such as seam strength, seam slippage, and seam efficiency using standard testing methods.

List of Experiments **45 Hours**

1. Determination of structural parameters (EPI, PPI, warp and weft yarn count, warp and weft yarn crimp %, cover factor, thickness, and GSM) of given woven cotton sample.
2. Determination of structural parameters (WPI, CPI, loop length, yarn count, tightness factor, thickness, and GSM) of given knitted cotton sample.
3. Determination of tensile strength of given woven fabric sample.
4. Determination of tearing strength of given woven fabric sample using Elmendorf Tear Tester.
5. Determination of bursting strength of given woven / knitted fabric sample.
6. Determination of fabric stiffness characteristics of the given fabric sample
7. Determination of fabric drape characteristics of the given fabric sample
8. Determination of crease recovery characteristics of the given fabric sample
9. Determination of fabric abrasion resistance of the given fabric sample
10. Determination of fabric pilling resistance of the given fabric sample

11. Determination of air permeability of the given fabric sample.
12. Determination of wicking behavior of the given fabric sample
13. Determination of the dimensional stability (-/+ %) of given woven or knitted fabric sample after washing.
14. Determination of color fastness to washing of given dyed fabric sample using Launder-o-meter and AATCC Gray scales.
15. Determination of dry and wet rubbing fastness of given dyed fabric sample using Crockmeter.
16. Determination of perspiration fastness of given dyed fabric sample using perspire-o-meter.
17. Measurement of seam strength, seam slippage, and seam efficiency of the given stitched woven fabric sample

Note : Minimum 12 experiments to be performed.

Total **45 Hours**

References:

1. Bureau of Indian Standards (BIS) – Relevant Indian Standard (IS) specifications for fabric and garment testing.
2. ASTM International – Annual Book of ASTM Standards (Textiles).
3. International Organization for Standardization (ISO) – ISO standards related to textile fibre and yarn testing.
4. AATCC – Technical Manual, American Association of Textile Chemists and Colorists.
5. Booth, J. E., Principles of Textile Testing.
6. Saville, B. P., Physical Testing of Textiles.
7. SITRA (South India Textile Research Association) – Technical manuals and testing guidelines on fabric and garment quality evaluation.

Course Title	:	**GARMENT MANUFACTURING TECHNOLOGY LABORATORY**					**Semester -V**
Course Code	:	**25HTPC307**	**L**	**T**	**P**	**C**	
Course Category	:	**PROGRAMME CORE**	0	0	4	2	

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Demonstrate proficiency in operating garment production machinery and performing basic sewing operations.

CO2 Draft, cut, and construct garment components such as plackets, pockets, collars, cuffs, sleeves, pleats, and neckline finishes using appropriate techniques.

CO3 Develop complete garments—including frock, T-shirt, shirt, kurta, and pants/shorts—by applying accurate body measurements, drafting principles, and sewing methods.

Samrat

List of Experiments **60 Hours**

1. Understanding the machines used for garment production.
2. Basic Body measurements, Ease and Seam allowances.
3. Basic stitches and practices.
4. Basic Seams and sewing seams.
5. Drafting and Construction of Plackets, Pockets.
6. Drafting and Construction of Collars and Cuffs, Sleeves.
7. Drafting and Construction of pleats, neckline finishes, tucks.
8. Drafting and Construction of Kids Frock.
9. Drafting and construction of Basic T-Shirt.
10. Drafting and Construction of Men's Shirt.
11. Drafting and Construction of Ladies Kurta.
12. Drafting and construction of Shorts / Pants.

Note: Minimum 10 experiments to be performed.

Total **60 Hours**

Course Title	:	**SOFT SKILLS & PERSONALITY DEVELOPMENT**				**Semester -V**
Course Code	:	**25AU301**	**L**	**T**	**P**	**C**
Course Category	:	**AUDIT**	2	0	0	0

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Understand soft skills, ethics, self-awareness, and career planning.

CO2 Improve behaviour, attitude, self-confidence, and constructive thinking.

CO3 Develop communication, presentation, and interpersonal skills.

CO4 Apply basic management, leadership, teamwork, and entrepreneurship concepts.

CO5 Practice stress management, problem solving, interview skills, and resume building.

Unit-I **Foundation of Soft Skills & Self-Development** **6 Hours**

Introduction to Soft Skills: Meaning, Importance, Types of Soft Skills-Professional Ethics & Values: Moral behaviour, workplace ethics, discipline- Goal Setting & Career Planning: SMART goals, Self-awareness: Understanding strengths, weaknesses, interests, and personality- Positive Attitude & Self-Motivation- Techniques to develop confidence and motivation.

Unit-II Personal Development & Behavioural Skills **6 Hours**

SWOT-Analysis -Self-Assessment, Identifying Strength & Limitations. Habits- Identifying Good and Bad Habits, Will-Power and Drives. Developing Self-Esteem and Building Self-Confidence, Significance of Self Discipline. Attitudes, Types of Attitudes, Factors Affecting Attitudes. Constructive Thinking Exploring & Managing Challenges.

Unit-III Communication Skills & Interpersonal Skills **6 Hours**

Basics of Communication - Process, types, and barriers. Verbal and Non-Verbal Communication - Tone, clarity, gestures, facial expressions. Presentation & Public Speaking Skills - Oral presentation, group discussions. Listening Skills- Active listening techniques, interpersonal understanding. Interpersonal Relationships - Team behaviour, empathy, coordination with peers.

Unit-IV Management Skills & Employability Skills **6 Hours**

Introduction to Management: Meaning, functions, and importance for diploma students. Leadership Skills- Qualities of a leader, leadership styles, decision making. Teamwork - Roles in a team, team building activities, conflict resolution. Entrepreneurship Basics- Characteristics of an entrepreneur, small business ideas. Industry Expectations - Workplace behaviour, professional grooming, workplace discipline.

Unit-V Stress Management & Professional Development **6 Hours**

Stress & Time Management- Types of stress, relaxation methods, prioritizing tasks. Problem Solving & Critical Thinking- Steps for decision-making, analytical thinking. Resume Preparation- Basic resume, CV, biodata creation. Interview Skills- Do's and don'ts, body language, common interview questions. Life-long Learning & Information Management- Learning strategies, digital literacy.

Total **30 Hours**

Text books:

1. Personality Development and Soft Skills – Barun K. Mitra.
2. Soft Skills for Polytechnic Students – Dr. P. Subba Rao.
3. Communication Skills – Sanjay Kumar & Pushpa Lata.
4. Essentials of Soft Skills – Dr. K. Alex.
5. Personality Development and Soft Skills – Barun K. Mitra.

References:

1. You Can Win – Shiv Khera.
2. Seven Habits of Highly Effective People – Stephen R. Covey.
3. Stress Management – Ronold G. Nathan & Edward A. Charlesworth.

Course Title	:	**ADVANCES IN SPINNING SYSTEMS**				**Semester - V**
Course Code	:	**25HTPE301**	**L**	**T**	**P**	**C**
Course Category	:	**PROGRAMME ELECTIVE - II**	3	0	0	3

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Interpret principles and mechanisms governing compact spinning systems effectively.

CO2 Explain principles and mechanisms involved in open-end and rotor yarn formation.

CO3 Illustrate yarn withdrawal mechanisms of rotor spinning including direction, navel, and withdrawal tube.

CO4 Describe operating principles of DREF and Murata Jet Spinner.

CO5 Analyze performance characteristics of Wrap, Self-twist, Electrostatic, Bobtex and Twilo yarns.

Unit-I Compact Spinning **9 Hours**

Basic principles of Compact spinning; Yarn formation; Spinning triangle and yarn hairiness; Different Compact spinning systems (Suessen - EliTe Compact Set, Rieter - ComforSpin, Rotorcraft - RoCoS, Zinser - CompACT3 & Oerlikon Schlafhorst - Zinser Impact FX); Compare compact yarn quality and properties with Ring yarn.

Unit-II New Spinning Systems & Rotor Spinning (Part-A) **9 Hours**

Limitation of Ring spinning system; Introduction to New spinning systems with advantages and limitations; Open End spinning - Basic principles of yarn formation; Rotor spinning - Objectives and passage of material through rotor spinning; Opening unit (The sliver Infeed and Opening)

Unit-III Rotor Spinning (Part-B) **9 Hours**

Yarn formation (Fibre flow into the Rotor, Formation of coherent fibre strand, Back doubling, Formation of the yarn); The Rotor- Influence of the Rotor, form and material; Rotor speed and diameter; Rotor groove; Yarn withdrawal and winding (Direction of withdrawal, Navel, Withdrawal tube); Rotor spun yarn characteristics and applications.

Unit-IV Friction and Air Jet Spinning **9 Hours**

Friction spinning - Working principles of DREF-I, DREF-II & DREF-III with yarn characteristics and its applications; False Twist Principles - Formation of yarn with the aid of false twist; Operating principles of Murata Jet Spinner (MJS) with yarn characteristic and applications.

Unit-V Other Non-Conventional Spinning Systems **9 Hours**

Principles and Operation - Wrap spinning, Self Twist spinning, Electrostatic spinning, Adhesive spinning- Bobtex and Twilo Spinning; Yarn characteristics and their applications.

Total **45 Hours**

Samrat

Text books:

1. W. Klein, "New Spinning Systems" The Textile Institute, Manual of Textile Technology Short Staple Spinning Series Volume 5, 1993.
2. C A Lawrence, Advances in Yarn Spinning Technology, Woodhead Publishing Series in Textiles, 2010
3. Carl A. Lawrence , "Fundamentals of Spun Yarn Technology", CRC Publications, 2003.
4. Eric Oxtoby, "Spun Yarn Technology", Butterworths, 1987.

References:

1. Hiren N. Amin, (2013). Compact spinning systems, Asian Textile Journal 22(6)
2. R. Chattopadhyay, Advances in Technology of Yarn Production, NCUTE.

Course Title	:	**KNITTING TECHNOLOGY**				**Semester - V**
Course Code	:	**25HTPE302**	**L**	**T**	**P**	**C**
Course Category	:	**PROGRAMME ELECTIVE - II**	3	0	0	3

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1	Explain the basic knitting terminology, specifications and functions of weft knitting machines
CO2	Explain the sequence of loop formation, passage of material and role of functional elements.
CO3	Identify different structures of the basic weft knitted structures
CO4	Explain the basic terminology, specifications & functions of flat knitting machines.
CO5	Demonstrate the loop formation in warp knitting

Unit-I Introduction to Knitting **9 Hours**

Introduction to knitting; Fundamental properties of a knitted fabric, Comparison of fabric properties - woven, knits and nonwoven fabrics; classification of knitting machines – weft knit & warp knit; yarn quality requirements for knitting. Preparation of staple yarns for weft and warp knitting. Basic terminologies such as course, wales, technical face, technical back, course length, stitch length, WPI, CPI, stitch density, GSM, Tightness Factor etc.,

Unit-II Fundamentals of Knitting **9 Hours**

Needles – types, merits and demerits, Loop forming sequence of latch, bearded & compound needles. Functional Elements: Sinkers, Cylinder, Dial, Cams, Creels, Feeder, Fabric Spreader, chain link, guide bar Take down and winding Mechanism.

Unit-III Basic of Knitted Loop Structures **9 Hours**

Elements of knitted loop structures, Factors affecting the formation of loop; effect of loop length and shape on fabric properties; Fundamentals of formation of knit, tuck and float stitches - open loop, closed loop- Principle of formation of knit, tuck, float stitches & their Line, Symbolic and diagrammatic notations, basic principle of loop formation in warp knitting and weft knitting, Basic Comparison between warp knitting and weft knitting.

Unit-IV Weft Knitted Structures **9 Hours**

Basic weft knitted structures production and properties - plain, rib, interlock and purl; Line, Symbolic and diagrammatic notations of basic weft knitted structures Basic principles and elements flat knitting machines; production of weft knitted structure using flat knitting machines & application of weft knitted fabrics.

Unit-V Warp Knitted Structures **9 Hours**

Basic warp knitted structures -Tricot and Rachel warp knitting structures & their production, properties and machines with their, Symbolic and diagrammatic notations. Uses of warp knitted fabrics in technical applications.

Total **45 Hours**

Text books:

1. Anbumani N., Knitting-Fundamentals, Machines, Structures and Developments, New Age International Publishers, 2007.
2. Ray, S. C. (Ed.). Fundamentals and advances in knitting technology. CRC Press. 2012.

References:

1. Henry Johnson, Introduction to Knitting Technology, Abhishek Publications, Chandigarh, 2006
2. Ajgaonkar D.B., Knitted Technology, Universal Publishing Corporation, Mumbai, 1998.
3. Spencer D.J., Knitting Technology: A Comprehensive Handbook, Woodhead Publishing Limited, England, 3rd Edition, 2001.
4. Maity, S., et. al., (Ed.). Advanced Knitting Technology, Woodhead Publishing, UK. 2021

Course Title	:	**NONWOVEN TECHNOLOGY**				**Semester - V**
Course Code	:	**25HTPE303**	**L**	**T**	**P**	**C**
Course Category	:	**PROGRAMME ELECTIVE - II**	3	0	0	3

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Describe the basic concepts, history, classification, and importance of non-woven fabrics.

CO2 Explain various web formation processes including dry-laid, wet-laid, spunbond, meltblown, and related technologies.

CO3 Compare and apply different bonding techniques such as needle punching, hydro-entanglement, thermal bonding, and chemical bonding.

CO4 Evaluate non-woven fabrics using appropriate testing methods and understand finishing processes for performance enhancement.

CO5 Identify and differentiate the applications of non-woven fabrics in medical, industrial, household, geotextile, and agricultural sectors.

Unit-I Introduction to Nonwoven **9 Hours**

Definition, scope, and history of nonwovens - Differences between woven, knitted, and nonwoven fabrics - Classification of nonwovens (by structure, bonding method, and end use) - Advantages and limitations of nonwovens - Overview of global and Indian non-woven industry - Raw materials used: natural fibres, synthetic fibres, regenerated fibres - Fibre properties important for non-woven applications.

Unit-II Web Formation Techniques **9 Hours**

Dry-laid processes – Carding – Garnetting -Air-laid web formation. Wet-laid web formation - Fibre preparation - Slurry formation - Web laying principles. Polymer-based web formation - Spunbond technology - Meltblown technology - Flash spinning.

Unit-III Bonding Techniques **9 Hours**

Mechanical Bonding - Needle punching, Hydro-entanglement (spunlace); Thermal Bonding - Hot-calender bonding, Through-air bonding, Ultrasonic bonding: Chemical Bonding - Types of binders (acrylic, latex, etc.), Binder application methods (padding, spraying, foam bonding). Comparison of bonding techniques.

Unit-IV Finishing and Quality Evaluation **9 Hours**

Finishing processes – Coating, Lamination, Printing, Surface finishing; Application of functional finishes – Antimicrobial,, flame retardant, hydrophobic/hydrophilic finishes; Testing and quality parameters – Areal Density, thickness, tensile strength, tear strength, Air permeability, absorbency, abrasion resistance; Standards for non-woven testing (IS, ASTM, ISO).

Unit-V Applications of Non-woven Fabrics **9 Hours**

Medical and hygiene products: Surgical gowns, masks, wipes, diapers, sanitary napkins; Industrial applications - Filtration, insulation, geotextiles, automotive textiles; Household applications - Furnishings, wipes, carpets; Agricultural non-wovens - Crop covers, shade nets; Packaging and protective materials; Future trends and sustainable non-woven technologies - Biodegradable fibres, Recycling and eco-friendly production.

Total **45 Hours**

Text books:

1. K. Kanakaiah, G. V. Naidu & K. Purushotham, Non-woven Technology, Indian Textile Publishers.
2. V. K. Kothari, Nonwoven Textiles, IIT Delhi Publications / NCUTE Series.
3. T. K. Roy, Non-woven Technology and Applications, Woodhead India.
4. NPTEL / NCUTE Learning Material on Nonwoven Technology

References:

1. Albin Turbak, Nonwoven Fabrics: Raw Materials, Manufacture, Applications, Characteristics, Testing, TAPPI Press.
2. W. Albrecht, H. Fuchs & W. Kittelmann, Nonwoven Fabrics Handbook, Wiley–VCH.
3. R. Russell, Handbook of Nonwovens, Woodhead Publishing.
4. A. R. Horrocks & S. C. Anand, Handbook of Technical Textiles.
5. S. P. Mishra, Nonwoven Technology, Tata McGraw-Hill.

Diploma in Handloom & Textile Technology

Curriculum & Syllabus (Semester VI)

S No	Course Category	Course Code	Course Title	Hours / week			Total Hrs / week	Credits
				L	T	P		
1	Programme Core	25HTPC308	Advanced Fabric Structures	3	0	0	3	3
2	Programme Core	25HTPC309	Technical Textiles	3	0	0	3	3
3	Humanities & Social Science	25HS301	Entrepreneurship and Start-ups	3	0	0	3	3
4	Programme Elective	25HTPE3**	Programme Elective – III	3	0	0	3	3
5	Programme Core	25HTPC310	Fabric Analysis & Costing Laboratory – II	0	0	2	2	1
6	Humanities & Social Science	25HS302	Seminar	0	0	3	3	1.5
7	Projects	25PR302	Major Project	0	0	8	8	4
				Total			**25**	**18.5**

Programme Elective

S No	Course Category	Course Code	Course Title	Hours / week			Total Hrs / week	Credits
				L	T	P		
1	Programme Elective	25HTPE304	Apparel Marketing and Merchandising	3	0	0	3	3
2	Programme Elective	25HTPE305	Fashion Designing	3	0	0	3	3
3	Programme Elective	25HTPE306	Home Textiles	3	0	0	3	3

Course Title	:	**ADVANCED FABRIC STRUCTURES**				**Semester -VI**
Course Code	:	**25HTPC308**	**L**	**T**	**P**	**C**
Course Category	:	**PROGRAMME CORE**	3	0	0	3

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Develop the figured single cloth design and understand the working of traditional handloom mountings.

CO2 Construct weave, draft, peg-plan for the production of figured Patent satin and piques.

CO3 Describe Figured warp backed cloth, figured weft backed cloth and Tapestry fabrics.

CO4 Develop the figured double cloth and Terry fabric.

CO5 Construct gauze and figured Leno fabrics.

Unit-I Jacquard Card Punching, Extra Warp and Weft Designs 9 Hours

Study of the jacquard graph development and card punching technique for straight tie straight draft, straight tie- sectional draft, sectional tie- sectional draft arrangements. Introduction of traditional loom mountings- heald and harness mountings, Pressure harness, Bannister harness, working comber boards in various designs. Advantages of using healds along with jacquard. Damask – Salient features – Structure of cloth – Designing, enlargement and punching techniques for jacquards. Figured extra warp and extra weft designs using jacquard and jacquard with healds.

Unit-II Figured Patent Satin and Piques 9 Hours

Figured Patent satin – structure of cloth – Use of straight tie with healds- use of working comber for saving of punched cards-Designing, simplified enlargement and punching technique. Figured piques – Structure of cloth – Use of Straight tie with healds – use of working comber board in fast back structures to save punched cards-designing and Simplified enlargement technique.

Unit-III Figured Backed Cloth 9 Hours

Figured warp backed cloth – Structure of cloth – Use of sectional harness in simplification of graph development process and punching technique. Figured weft backed cloth – Structure of cloth – Separation of two series of weft for simplifying graph development process and punching technique. Tapestry – Traditional and modern Tapestries – Simple weft faced tapestries; two coloured weft faced reversible structures; three colour and four colour weft faced reversible and non-reversible structures. Modern Tapestry–3 pick & 4 picks tapestry using jacquard and heald method. Designing, simplified enlargement and punching techniques

Unit-IV Figured Double Cloth and Terry 9 Hours

Study on Figured double cloth and Figured Terry (3 and 4 pick terry weave) –Design development and punching process for straight harnessing with straight draft , straight harnessing with sectional draft ,sectional harnessing with sectional draft – Structure of cloth.

Unit-V Gauze and Figured Leno **9 Hours**

Figured Leno and gauze fabrics – Salient features-Bottom douping and top douping. Simultaneous top and bottom douping, Easer and Shaker device. Stripe and Check effect; plain, twill and leno combination; Cord effect, Net leno. Indication of leno structures, drafting plan and lifting plan of straight and pointed draft structures. Chenille Axminister pile fabrics manufactured using handlooms - technique of fabric manufacture and designing.

Total **45 Hours**

Text books:

5. Grosicki Z. J.” Watson’s Textile Design and Color’ ,Vol.1, Woodhead publications, Cambridge England, 2004.
6. Grosicki Z . J.” Watson’s Advanced Textile Design and Color’ ,Vol II, Butterworth Lonon 1989.
7. Grammar of Textile Design by H. NISBET, F.T.I

References:

1. Geormar D. Woven Structure and Design Part I Single Cloth Construction WIRA UK 1986
2. Georner D, “Woven Structure and Design, Part 2: Compound Structures”, WIRA,U.K., 1989.
3. X. Chen,M. Spola,J. Gisbert Paya &P. Mollst Sellabona1,Experimental Studies on the Structure and Mechanical Properties of Multi-layer and Angle-interlock Woven Structures,Pages 91-99

Course Title	:	**TECHNICAL TEXTILES**				**Semester -VI**
Course Code	:	**25HTPC309**	**L**	**T**	**P**	**C**
Course Category	:	**PROGRAMME CORE**	3	0	0	3

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1	Explain the concept, scope, classification, and materials used in technical textiles, and apply technical textile knowledge for product selection & future career opportunities.
CO2	Describe the functional requirements and applications of clothing and home technical textiles.
CO3	Demonstrate an understanding of medical, safety and protective textile applications.
CO4	Explain the functions and applications of agro and geotextiles in agriculture and civil engineering.
CO5	Identify the role of industrial, automotive, and packaging textiles, including FIBC bags, in technical sectors.

Unit-I Basics of Technical Textiles & Raw Materials **9 Hours**

Introduction, scope and opportunities of technical textiles; global and Indian scenario, market demand and government initiatives such as NTTM and other schemes; requirement of skilled workforce; classification of technical textiles. Raw materials used in technical textiles: introduction, properties & applications of aramid fibres, glass fibres, carbon fibres and UHMWPE.

Unit-II Clothtech and Hometech **9 Hours**

Properties required for functional garments: thermal balance, UV resistance, antibacterial finishes, and comfort; functional accessories; home textiles with enhanced performance; fire-retardant curtains, antimicrobial bedding and carpets. Everyday technical textile products: school bags, shoes, backpacks, socks and similar items.

Unit-III Meditech and Protech **9 Hours**

Meditech: Definition, fibres used for medical applications and classification of medical textiles - health care and hygiene products (surgical gowns, face masks, caps and beddings), implantable (sutures) and non-implantable materials (wound dressings and bandages).

Protech: requirements and principles of protective clothing; fibre and fabric requirements for ballistic protection, firefighting jackets, chemical protective garments and industrial workers' safety clothing.

Unit-IV Agrotech and Geotech **9 Hours**

Agrotech: crop covers, shade nets, mulching fabrics, fishing nets and agricultural applications.

Geotech: definition, essential properties, types of geotextiles; functions of geotextiles such as separation, drainage, filtration, reinforcement, protection and erosion control; applications of geotextiles in roads, railways and river banks. Introduction to textile composites: constituents and classifications.

Unit-V Indutech, Mobiltech and Packtech. **9 Hours**

Indutech: Definition and scope of industrial textiles; principles and types of filtrations for gas and liquid; conveyor belts and ropes; reinforcement textiles – tyre cord: definition, fibres used, basic requirements and applications.

Mobiltech: construction details and materials used in automotive textiles; quality and performance requirements for seatbelts and airbags.

Packtech: definition and roles of packaging textiles; types of Packtech – polyolefin sacks (PP/PE), leno bags, wrapping materials, jute sacks and Flexible Intermediate Bulk Container bags (FICB).

Total **45 Hours**

Text books:

1. Technical Textiles, R. Alagirusamy & A. Das (Woodhead Publishing).
2. Handbook of Technical Textiles – Edited by A. R. Horrocks & S. C. Anand, Woodhead Publishing, Cambridge (2000).
3. Textile Terms & Definitions for Technical Textiles– TIFAC / SITRA.
4. Handbook of Industrial Textiles, Adanur S, 2001. Technomic publications.

References:

1. Design and manufacture of Textile Composites, Kanna M.C., Hearle, O Hear., Textile Progress, Textile Institute, Manchester, April 2004.

2. Textile for production, Textile progress, Scott, Textile Institute, Manchester. Oct. 2005.
3. Textiles in sports, Shishoo, Textile progress, Textile Institute, Manchester, Aug.2005
4. Medical Textile & Biomaterials for Health care, Kennady, Anand Miraftab, Rajandran, Woodhead Publishing Ltd., UK, 2005.
5. Medical Textiles-International Conference on Medical Textiles, Bolton, Woodhead Publication, Cambridge, 1997 Geo textile by John, N.W.M, Blackie publication, Glasgow, 1987.
6. www.nttm.texmin.gov.in / www.temin.gov.in.

Course Title	:	**ENTREPRENEURSHIP AND START-UPS**				**Semester - VI**
Course Code	:	**25HS301**	**L**	**T**	**P**	**C**
Course Category	:	**HUMANITIES & SOCIAL SCIENCE**	3	0	0	3

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1	Explain the fundamentals of entrepreneurship, start-ups, types of business organizations, and government support schemes.
CO2	Identify viable business ideas and prepare a basic business plan using creativity and planning techniques.
CO3	Analyze customers and competitors and apply basic marketing, accounting, and risk concepts for business start-up.
CO4	Apply basic management principles to organize work, manage people, and handle simple financial activities.
CO5	Describe sources of finance, methods of protecting business ideas, investor pitching, and exit planning.

Unit-I Introduction to Entrepreneurship and Start-ups 9 Hours

Entrepreneurship: Introduction, Definition and significance, characteristics, classification - Types of Business Structures: sole proprietorship, partnership, and company; Government Schemes for Textile Entrepreneurs- Handloom Promotion programs, schemes available MSME, NABCONS, Textile Clusters successful entrepreneur and expos, producer companies, GEM on boarding, craft village and Design Resource Centres.

Unit-II Business Ideas and Their Implementation 9 Hours

Discovering ideas- creativity and innovation in business, visualizing the business-Applications of Activity Map: Planning and development, Risk assessment, Resource allocation, policy formulation- Business plan: meaning, significance, components, challenges.

Unit-III Idea to Start-up 9 Hours

Market analysis: Identifying the target market and customers- competition evaluation, strategy formation and development- Basics of marketing - Accounting concepts- Risk Analysis.

Unit-IV Management **9 Hours**

Management: Meaning, Definition and Functions; Levels of management, organisational structure in start-ups; Recruitment, Selection, Training and development, Performance appraisal- Introduction to financial management – Budgeting and cash management.

Unit-V Financing, Protection, Exit and Succession Strategies **9 Hours**

Sources of finance for small enterprises: self-finance, Institutional finance, and government assistance- Introduction to investor pitching- Fundamentals of intellectual property rights: Patents, Trademarks, and copyrights -Importance of protecting business ideas and innovations- Basic exit strategies- Bankruptcy- Succession planning and business continuity.

Total **45 Hours**

Text books:

1. Vasant Desai, Dynamics of Entrepreneurial Development and Management, Himalaya Publishing House.
2. S.S. Khanka, Entrepreneurial Development, S. Chand & Company.
3. Eric Ries, The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses, Penguin UK ISBN – 978-0670921607
4. Adrian J. Slywotzky with Karl Weber, Demand: Creating What People Love Before They Know They Want It, Headline Book Publishing ISBN – 978-0755388974
5. Clayton M. Christensen, The Innovator's Dilemma: The Revolutionary Book That Will Change the Way You Do Business, Harvard business ISBN: 978-142219602

References:

1. Poornima M. Charantimath, Entrepreneurship Development, Pearson Education.
2. Robert D. Hisrich and Michael P. Peters, Entrepreneurship, McGraw-Hill Education.
3. https://www.fundable.com/learn/resources/guides/startup
4. https://corporatefinanceinstitute.com/resources/knowledge/finance/corporatestructure/
5. https://www.finder.com/small-business-finance-tips
6. https://www.profitbooks.net/funding-options-to-raise-startup-capital-for-your-business/

Course Title	:	**FABRIC ANALYSIS & COSTING LABORATORY – II**				**Semester - VI**
Course Code	:	**25HTPC310**	**L**	**T**	**P**	**C**
Course Category	:	**PROGRAMME CORE**	0	0	2	1

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Analyse weave structure, construction parameters, and weaving techniques of traditional and handloom fabrics.

CO2 Extract production particulars of plain, multi-treadle, extra warp/weft, double cloth, and jacquard handloom fabrics.

CO3 Estimate production requirements and prepare cost details for different categories of handloom fabrics.

List of Experiments **30 Hours**

1. Analysis of weave, construction parameters, weaving techniques and costing of at least two traditional handloom product
2. Extracting the production particulars of given plain fabric sample and furnishing the production and cost details.
3. Extracting the production particulars of given handloom multi treadle design fabric sample and furnishing the production and cost detail
4. Extracting the production particulars of given handloom extra warp and weft sample and furnishing the production and cost detail
5. Extracting the production particulars of given double cloth sample and furnishing the production and cost detail
6. Extracting the production particulars of given handloom jacquard design fabrics and furnishing the production and cost detail

Total **30 Hours**

Course Title	:	**APPAREL MARKETING AND MERCHANDISING**				**Semester -VI**
Course Code	:	**25HTPE304**	**L**	**T**	**P**	**C**
Course Category	:	**PROGRAMME ELECTIVE - III**	3	0	0	3

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Explain various types of apparel market and advertising techniques involved in merchandising.

CO2 Discuss the types and functions of merchandising.

CO3 Explain the factors involved in sourcing, supply chain and material management systems.

CO4 Classify various types of documents used for export of apparels.

CO5 Develop production scheduling and manage time in marketing and merchandising

Unit-I Marketing **9 Hours**

Apparel marketing: Definition, scope, functions and strategies of marketing with respect to product and brand. Introduction to Marketing Models; Market Research: International market, retail and wholesale market and domestic market. Advertising: Purpose, methods, types of advertising media, sales promotion methods.

Unit-II Merchandising **9 Hours**

Apparel Merchandising: Definition, functions of merchandising division, roles and Responsibilities of merchandiser. Seasons of sales. Types of Merchandising: Principles and techniques of apparel merchandising, retail merchandising, visual merchandising, interfacing merchandising with production.

Unit-III Sourcing **9 Hours**

Sourcing: Definition, need and important factors in sourcing, methods of sourcing raw materials, sourcing of accessories, manufacturing resource planning, principles of MRP, Overseas sourcing - sourcing strategies- best sourcing practice in apparel and textile businesses. Supply chain and demand chain analysis, Materials management for quick response, Just in Time and Buying houses.

Unit-IV Documentation **9 Hours**

Order confirmation, various types of export documents, pre-shipment, post-shipment documentation - terms of sale - payment – shipment. Government policies, incentives and initiatives for apparel export. Export Risk management.

Unit-V Time Management **9 Hours**

Time management in merchandising, Lead times, production scheduling, route card format, accessories follow-up, practical check points, computer applications in marketing and merchandising.

Total **45 Hours**

Text books:

1. V. R. Sampath, P. Perumalraj and M. Vijayan, “Apparel Marketing and Merchandising”,Kalaiselvam Pathippakam, Coimbatore, 2007.
2. Vijay Barotia, “Marketing Management”, Mangal Deep Publication, New Delhi, 2001.

References:

1. Moore Evelyn C., “Path for Merchandising- A Step by Step Approach”, Thames and Hudson Ltd., London, 2001.
2. Jarnow J. and Dickerson K. G., “Inside the Fashion Business”, Prentice Hall, New Delhi, 1997
3. ELaine Stone and Jean Samples, “Fashion Merchandising”, McGraw Hill Books, Singapore, 1985
4. Ruth E Glock, Grace I Kunz, “Apparel Manufacturing”, Sewn Product Analysis - 3rd Edition,Prentice Hall Inc., 2000
5. J. A. Jarnow, M. Guerreiro and B. Judelle, “Inside the Fashion Business”, Macmillan PublishingCompany, 1990.
6. Grace I. Kunz, “Merchandising: Theory, Principles and Practice”, Fairchild Books, 2005
7. Elaine Stone and A. Jean, “Fashion Merchandising - An Introduction”, McGrawHill BookCompany, 1990.

Course Title	:	**FASHION DESIGNING**				**Semester -VI**
Course Code	:	**25HTPE305**	**L**	**T**	**P**	**C**
Course Category	:	**PROGRAMME ELECTIVE - III**	3	0	0	3

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Define the basics of fashion terms, the fashion cycle, and fashion designing.

CO2 Explain the concept of design and its importance in fashion.

CO3 Describe the various principles of design and their use in creating aesthetically pleasing garments.

CO4 Identify garment components and their role in enhancing design and aesthetics

CO5 Adapt fashion forecasting, silhouettes, wardrobe planning, and portfolio development.

Unit-I Introduction to Fashion Design **9 Hours**

Definition and origin - terms & definitions - reasons for change in fashion - classification of fashion – Style, classic, FAD, Trend - fashion cycle and theories of fashion. Fashion designing - designers' role in styling and production of costumes

Unit-II Elements of Design **9 Hours**

Design aesthetics – Definition, Types - Structural and decorative design. Elements of design: Lines – varieties and their application in a design. Shapes - Types – Natural, stylized, geometrical, and abstract. Colour – Definition and origin – Characteristics (hue, value and intensity) - Prang colour chart - color harmony. Psychology of colour and its application in apparel market. Texture – types of texture and its application in clothing.

Unit-III Principles of Design **9 Hours**

Balance - asymmetrical and symmetrical. Types – Formal, Informal and radial. Proportion or scale – planning the shapes and space. Rhythm – through repetition, alternation, progression and gradation. Emphasis using contrast colours and background. Harmony of lines, shapes, colour and textures.

Unit-IV Designing of Garment Components **9 Hours**

Skirts - Basic concepts in designing the variety of skirts. Trousers – Basic concepts in designing the variety of trousers. Introduction to neck lines, waistlines, hemlines, collars, sleeves, cuffs, plackets and pockets. Fullness applied in apparel –tucks, pleats, gathers, shirring, frills or ruffles, flounces.

Unit-V Forecasting & Portfolio Development **9 Hours**

Market research - method of fashion Trend forecast. Silhouettes – Types and their application in everyday use. Introduction to Wardrobe planning for apparel. Portfolio development– Purpose, Steps, and Process. Brief on Fashion Shows.

Total **45 Hours**

Text books:

1. Sumathi G. J, " Elements of Fashion and Apparel Design", New Age International Publishers, London & New Delhi (2nd Edition ISBN-9789395161381) 2023.
2. Parul Bhatnagar, "Traditional Indian Costumes and Textiles", Abhishek Publications, Chandigarh,2004.
3. Elaine Stone, "The Dynamics of Fashion", Fairchild Publications, New York, 2001.

References:

1. Peacock J., "Fashion Source Books", Thames and Hudson, 1997-98.
2. Gini Stephen Frings, "Fashion Concept to Consumer", Prentice Hall, New Jersey, 2004.

Course Title	:	**HOME TEXTILES**				**Semester - VI**
Course Code	:	**25HTPE306**	**L**	**T**	**P**	**C**
Course Category	:	**PROGRAMME ELECTIVE - III**	3	0	0	3

Course Outcomes:

At the end of the study of this course, the students will be able to

CO1 Summarize types of home textiles and materials used for home textiles.

CO2 Assess suitability of upholstery, table textiles, living room furnishing, kitchen textiles, curtains and draperies according to customer needs.

CO3 Analyse bed linen and bath linen requirements in technical terms

CO4 Select floor coverings according to specific needs

CO5 Discuss about care, washing methods, stain removal and testing of home textiles.

Unit-I Fundamentals and Living Room Textiles **9 Hours**

Home Textiles: Definition, different types of home textiles, selection of fibers, Colors, Designs, factors affecting selection of home textiles, woven & Nonwoven; Upholstery; Living Room Furnishing - Sofa covers, wall hangers, cushion, bolster. Draperies and curtains- choices of fabrics, calculating the amount of material needed; Methods of furnishing draperies at the top with tucks or pleats;

Unit-II Kitchen Textiles **9 Hours**

Kitchen Textiles: Definition, Types- apron-dish cloth, bread bag, pot holders, hand towels, Tea towels, Oven Mittens, Table Napkins and covers for appliances. Table Textiles - Definitions, Different types, table mats, table cloth and hand towels, selection of material and use.

Unit-III Bed and Bath Linens **9 Hours**

Bed Linen -Definitions, different types of bed linens, sheets, blankets, comforters, comforter covers and Duvets, Velour - Types of velvet and construction. Mattress - Mattress covers, pads, pillows; Made-ups in hospitals; Bath Linens: Towels - Types, Construction of towels- weave, pile height - pattern - dyeing and finishing, napkins; Bath sheets, Bath robes – types and functions and Bath mats.

Unit-IV Floor Coverings **9 Hours**

Introduction to Floor covering: hard floor coverings, resilient floor coverings, soft floor coverings, Rugs, cushions pads; Carpet Manufacture methods & Types: Tufted, Hand tufted, Needle felt, Woven & Knotted. Wilton & Administer - Knitted, Stitch bonding & Flocking; Introduction to Carpet fibers & yarns.

Unit-V Care and Testing of Home Textiles **9 Hours**

Introduction to Care of Home Textiles; Washing and cleaning Methods: Kneading and squeezing, Suction washing, Use of washing Machine; Stain Removal: Identification of stain, general procedure for stain removal, Bleaches for stain removal, optical brighteners and blues; Care Labels; Thread Counts (TC) in Home Textiles; Testing of home textiles – Principle and application of: colour fastness, shrinkage, abrasion, Absorption, and flammability tests.

Total **45 Hours**

Text books:

1. Subrata Das., Performance of Home Textiles, Wood head Publishing India PVT. LTD, 2010
2. Fundamentals of Textiles and their care, Susheela Dantiyagi. Orient Longman Ltd., New Delhi
3. Household Textiles and Laundry work, DurgaDuelkar, Athma Ram and Sons, New Delhi
4. Soft furnishing book by Kartin Cargill, Reed consumer books Limited, London

References:

1. Simplicity's (1993). Simply the best home decoration book, A fire side book as published by Simon and Schulster (New York), London. The simplicity Pattern company inc
2. Soft furnishing by Saarah Campbell and Hilary More, Mac Donald Books, QED Publishers Limited, London
3. Wingate I.B., & Mohler J.E., Textile Fabrics & Their Selection, Prentice Hall Inc, New York
4. Alexander N.G., Designing Interior Environment, Mass Court Brace Covanorich, New York, 1972