B.Tech. TEXTILE TECHNOLOGY
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FOREWORD

Textiles rank as the second most essential human need. Since they have such a big influence on our daily lives, everyone has to be aware of them. Since the beginning of time, people have utilised various textiles for a variety of purposes, including warmth, personal decorating, covering, and even as a way to show off wealth. Today, all people are the ultimate customers, and textiles are still used to achieve these goals.

B.Tech. programme of Textile Technology is aimed at offering the knowledge and skills of invention, development, design, operation and management of processes in textile industries. It combines the work of several fields such as fibers, yarn, fabric, wet processing and garment making.

In the new curriculum of R22, skill-oriented activities are included to enable the students to acquire hands-on experience of technology to make them better suited for industry requirements.

R22 curriculum comprises of :

- *Revision in tune with National Education Policy 2020.*

- *Various exit options.*

- *Regular Degree along with Honours / Minor Degree.*

- *The reduction in total credits.*

- *Module wise course syllabus.*

- *Advanced courses like technical textile, and sustainability.*

In R22 curriculum, every care has been taken to accommodate the knowledge and skill requirements of industry through proper activities for practice. While making the graduates industry ready, it also enables them to be successful in competitive examinations like GATE. The focus area of each unit in every course is clearly defined. The Board of Studies consisting of eminent personalities along with experienced faculty members of the university have designed the curriculum to offer knowledge and skill of textile technology on above mentioned areas. The curriculum includes concepts with skill based tasks through integrated laboratory and activities combined with theory. The department aims to make graduates ready for the industrial needs.

External BoS Members:

1. *Dr. D. Raja, Professor & Head, Dept. of Fashion Technology, SONA College of Technology, Salem, Tamil Nadu*

2. *Dr. T. Saravana Kumar, Director-Operations, Dev Innotech LLP, Karur and Active Consultant, Tamil Nadu.*

   I thank all the BoS Members, Academic Council Members and University authorities for encouraging and supporting us in designing this innovative curriculum for our students.

<div align="right">

Dr. M. Ramesh Naidu
HoD, Chemical Engineering

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VISION

To evolve into a Centre of Excellence in Science & Technology through creative and innovative practices in teaching – learning, towards promoting academic achievement and research excellence to produce internationally accepted, competitive and world class professionals who are psychologically strong & emotionally balanced, imbued with social consciousness & ethical values.

MISSION

To provide high quality academic programmes, training activities, research facilities and opportunities supported by continuous industry - institute interaction aimed at promoting employability, entrepreneurship, leadership and research aptitude among students and contribute to the economic and technological development of the region, state and nation.

Department of
TEXTLE TECHNOLOGY

VISION of the department

To attain global recognition in research in training students for meeting the challenging needs of textile and allied industries and society.

MISSION of the department

M_1: To enlighten the students about the latest technology in textile and garment through innovative educational practices and multi-disciplinary research.

M_2: To engage with the industry through consultancy as solution provides.

B.Tech in Textile Technology

Programme Educational Objectives (PEOs)

Graduates of Food Technology programme should be able to:

PEO1: Production Process and Solution to Problems: Graduates are competent in textile production processes and be able to identify problems and suggest suitable solutions.

PEO2: Modern tools & Technology and Ethics: Graduates use latest tools and technology for the produc- tion of textile materials and serve society in an ethical manner.

PEO3: Skills, Entrepreneurship and Life Long Learning: Graduates will exhibit skills in their career anddevelop entrepreneurial culture through life-long learning.

Program Specific Outcomes (PSOs)

Graduates of Food Technology programme should be able to:

PSO1: Application of Basic Concepts: Apply fundamental concepts in the areas of spinning, weaving, testing, garment making and processing.

PSO2: Solution for Industrial Problems: Solve industrial problems in textile industries considering environmental issues to improve the quality and productivity.

PSO3: Moral Values: Demonstrate social and ethical responsibilities relevant to textile industries.

Program Outcomes (POs)

Graduates of Food Technology programme should be able to:

PO1: **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamen- tals, and an engineering specialization to the solution of complex engineering problems.

PO2: **Problem analysis**: Identify, formulate, review research literature, and Analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sci- ences, and engineering sciences.

PO3: **Design/development of solutions**: Design solutions for complex engineering problems and de- sign system components or processes that meet the specified needs with appropriate consider- ation for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess soci- etal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustain- able development.

PO8: **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: **Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: **Project management and finance:** Demonstrate knowledge and understanding of the engineer- ing and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

R22 B.Tech.

4 YEAR

COURSE STRUCTURE - R22

I Year I Semester

Course Code	Course Title	L	T	P	C
22MT103	Linear algebra and ordinary differential equation	3	2	-	4
22CT101	Applied Chemistry	2	-	2	3
22EE101	Basic of Electrical & Electronics Engineering	2	-	2	3
22TT102	IT Workshop & Textile Engineering products	1	-	4	3
22TP103	Programming in C	2	-	4	4
22EN102	English Proficiency and Communication SKILLS::	-	-	2	1
22SA101	Physical Fitness, Sports & Games – I	-	-	3	1
22TP101	Constitution of India	-	2	-	1
	Total	**10**	**4**	**17**	**20**
	Contact Hours	31 Hrs			

I Year II Semester

Course Code	Course Title	L	T	P	C
22MT112	Partial differential equations and vector calculus	3	2	-	4
22PY102	Engineering Physics	2	-	2	3
22ME101	Engineering Graphics	2	-	2	3
22TP104	Basic coding competency	-	1	3	2
22TT101	Textile Fibers	3	-	2	4
22EN104	Technical English Communication	2	-	2	3
22SA103	Physical Fitness, Sports and Games – II	-	-	3	1
22SA102	Orientation Session	-	-	6	3
	Total	**12**	**3**	**20**	**23**
	Contact Hours	**35 Hrs**			

COURSE STRUCTURE - R22

R22 B.Tech.
4YEAR
DEGREE PROGRAMME

II Year I Semester

Course Code	Course Title	L	T	P	C
22ST202	Probability & Statistics	3	2	-	4
22TP201	Data Structure	2	2	2	4
22TT201	Yarn manufacturing	2	2	-	3
22TT202	Fabric Manufacturing	3	-	2	4
22TT203	Testing of Fibers and Yarns	3	-	2	4
22TT204	Technology of preparatory and dyeing	3	-	2	4
22SA201	Life SkillsI	-	-	2	1
-	NCC/ NSS/ SAC/ E-cell/ Student Mentoring/ Social activities/ Publications.	-	-	-	1
	Total	**16**	**6**	**10**	**25**
	Contact Hours	32 Hrs			

II Year II Semester

Course Code	Course Title	L	T	P	C
22TP203	Advanced Coding Competency	-	-	2	1
22TP204	Professional Communication	-	-	2	1
22CT201	Environmental Studies	1	1	-	1
22MS201	Management Science	2	2	-	3
22TT205	Fabric Structure and Design	3	-	2	4
22TT206	Technology of Knits and Nonwovens	2	2	-	3
	Department Elective – 1	2	2	-	3
	Open Elective – 1	2	2	-	3
22SA202	Life Skills II	-	-	2	1
		12	**9**	**8**	**20**
	Minor / Honours - 1	3	-	2	4
	Total	**15**	**9**	**10**	
	Total	**34 Hrs**			

R22 B.Tech.

4 YEAR

DEGREE PROGRAMME

COURSE STRUCTURE - R22

III Year I Semester

Course Code	Course Title	L	T	P	C
22TT301	Testing of Fabrics and Garments	3	-	2	4
22TT302	Technology of printing and finishing	3	-	2	4
22TT303	Technical Textiles	3	2	-	4
22TT304	Inter-Disciplinary Project	-	-	2	-
22TT305	Industry interface course	1	-	-	1
22TP301	Soft Skills Laboratory	-	-	2	1
	Department Elective – 2	2	2	-	3
	Open Elective – 2	2	2	-	3
	NCC/ NSS/ SAC/ E-cell/ Student Mentoring/ Social activities/ Publication.	-	-	-	1
	Total	**14**	**6**	**8**	**21**
	Minor / Honours - 2	3	-	2	4
	Total	**17**	**6**	**10**	
	Contact Hours	**33 Hrs**			

III Year II Semester

Course Code	Course Title	L	T	P	C
22TP302	Quantitative aptitude & Logical reasoning	1	2	-	2
22TT306	Apparel Production Technology	3	-	2	4
22TT307	Advanced Yarn & Fabric Formation	2	2	-	3
22TT308	Inter-Disciplinary Project	-	-	2	2
-	Department Elective – 3	2	2	-	3
-	Department Elective – 4	2	2	-	3
-	Open Elective – 3	2	2	-	3
	Total	**12**	**10**	**4**	**20**
	Minor / Honours - 3	3	-	2	4
	Total	**15**	**10**	**6**	
	Contact Hours	**31 Hrs**			

COURSE STRUCTURE - R22

R22 B.Tech.

4 YEAR

DEGREE PROGRAMME

IV Year I Semester

Course Code	Course Title	L	T	P	C
22TT401	Process Control in Textile manufacturing	3	2	-	4
22TT402	Industrial Engineering for Textiles and Apparels	3	2	-	4
	Department Elective – 5	2	2	-	3
	Department Elective – 6	2	2	-	3
	Department Elective – 7	2	2	-	3
	Department Elective – 8	2	2	-	3
	Total	**14**	**12**	**-**	**20**
	Minor / Honours – 4	3	-	2	4
	Total	**17**	**12**	**2**	
	Contact Hours	**31 Hrs**			

IV Year II Semester

Course Code	Course Title	L	T	P	C
22TT403 / 22TT404	Project Work / Internship	-	2#	22	12
	Total	**-**	**2#**	**22**	**12**
	Minor / Honours – 5 (for project)	-	2	6	**4**
	Total	**-**	**4**	**28**	**16**
	Contact Hours	**32 Hrs**			

for interaction between Guide and students

R22 B.Tech.

4 YEAR

DEGREE PROGRAMME

COURSE STRUCTURE - R22

Department Electives

Course Code	Course Title	L	T	P	C
Pool of Department Electives - 1					
22TT801	Pattern making	2	2	-	3
22TT802	Garment Construction Techniques	2	2	-	3
22TT803	Characteristics of Textile Fibers	2	2	-	3
Stream - 1 Advances in Textile Manufacturing (DE2 - DE7)					
22TT804	Technology of Manufactured fibers	2	2	-	3
22TT805	Advances in Knitting Technology	2	2	-	3
22TT806	Technology of Non Wovens and Geo Textiles	2	2	-	3
22TT807	Maintenance of Textile Machinery	2	2	-	3
22TT808	Retailing and Branding of Apparel	2	2	-	3
22TT809	Total quality management in textile industries	2	2	-	3
Stream - 2 Fashion Technology (DE2 - DE7)					
22TT810	Fashion theory	2	2	-	3
22TT811	Garment Production Machinery	2	2	-	3
22TT812	Costing of textile and apparel production	2	2	-	3
22TT813	Fashion Marketing and Visual Merchandising	2	2	-	3
22TT814	Statistics in Textile Industries	2	2	-	3
22TT815	Textile and Apparel EXIM Management	2	2	-	3
Stream - 3 Advanced Chemical Processing (DE2 - DE7)					
22TT816	Dyes and pigments	2	2	-	3
22TT817	Technology of dyeing and printing machines	2	2	-	3
22TT818	Advances in Textile Printing and Finishes	2	2	-	3
22TT819	Effluent Treatment and Pollution Control	2	2	-	3
22TT820	Eco-Friendly Wet Processing	2	2	-	3
22TT821	Sustainable Practices in Textile Industry	2	2	-	3
Pool for Department Elective - 8					
22TT822	High Performance Fibers	2	2	-	3
22TT823	Fundamentals of textile 4.0	2	2	-	3
22TT824	Textile Reinforced Composites	2	2	-	3
22TT825	Medical Textiles	2	2	-	3
22TT826	Protective Textiles	2	2	-	3
22TT827	Home Textiles	2	2	-	3

List of Honor/Specialization Courses

Course Code	Course Title	L	T	P	C
22TT951	Operations research for engineers	3	2	-	4
22TT952	Fashion product development	3	2	-	4
22TT953	Apparel Production Planning and Process Control	3	2	-	4
22TT954	Apparel Marketing and Merchandising	3	2	-	4
22TT955	Lean and Six Sigma for Textiles and Apparel	3	2	-	4

I
Y E A R

TEXTILE TECHNOLOGY

B.Tech.

COURSE CONTENTS
I SEM & II SEM

22MT103 LINEAR ALGEBRA AND ORDINARY DIFFERENTIAL EQUATIONS

Hours Per Week :

L	T	P	C
3	2	0	4

Linear Algebra and Partial Differential Equations

Image Source: https://m. media-amazon.com/ images/I/41VhATNx1eL. jpg
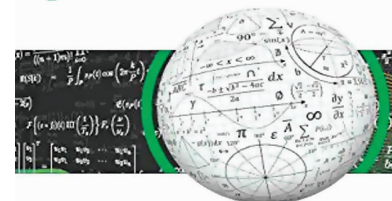
PREREQUISITE KNOWLEDGE: Basics of matrices, Differentiation and Integration.

COURSE DESCRIPTION AND OBJECTIVES:

The goal of this course is to build a grasp of the principles of mathematics through matrices, differential equations and applications that serves as an essential tool in several engineering applications.

MODULE-1

UNIT-1   **12L+8T+0P=20 Hours**

MATRICES:

Definition of matrix; Types of matrices; Algebra of matrices, adjoint of a matrix, inverse of a matrix through adjoint and elementary row operations, Rank of a matrix, Echelon form, Normal form.

Eigen values and Eigen vectors (up to 3 x 3 matrices only) and properties (without proofs).

UNIT-2   **12L+8T+0P=20 Hours**

APPLICATIONS OF MATRICES:

Consistency of system of linear equations, Solution of system of linear equations having unique solution and involving not more than three variables by Gauss elimination method and Gauss Jordan method.

Cayley-Hamilton theorem (without proof), Power of a matrix, Inverse of a matrix.Strength of materials and strength of beams using Eigen value and Eigen vectors.

PRACTICES:

- When inverse of a matrix exist and find it.
- How does rank of matrix is independent of the elementary operations? Explain with suitable examples.
- How does rank of matrix is unique, explain with suitable examples.
- When eigen values and eigen vectors are possible for a matrix? Discuss with suitable examples.
- Discuss the possibility of solution of a system of equations.
- Discuss when inverse and power of a matrix exist using Cayley-Hamilton theorem.

MODULE-2

UNIT-1   **12L+8T+0P=20 Hours**

ORDINARY DIFFERENTIAL EQUATIONS (ODE):

First Order Differential Equations: Introduction to ODE, variable separable method, homogenous and non-homogenous differential equations, linear differential equations, Bernoulli's equations.

Second Order Differential Equations: Linear differential equations with constant coefficients with RHS of the form eax, xn, sin(ax) or cos(ax).

UNIT-2   **12L+8T+0P=20 Hours**

APPLICATIONS OF ODE:

Applications of ODE: Newton's law of cooling, Law of natural growth and decay, LR Circuit.

PRACTICES:

- Check the order and degree of an ODE.
- Find solution for any four ordinary differential equations by Apply suitable method.
- Find numerical solution for any four ordinary differential equations by Apply suitable method.
- Discuss some applications of ODE.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Mod-ule No.	Mapping with POs
1	Apply the concepts of rank, eigen values and eigenvectors of a matrix and finding inverse of a matrix and powers of a matrix.	Apply	1	1, 2, 9,12
2	Apply differential equations in real life problems.	Apply	2	1, 2, 9,12
3	Analyse the solution of a system of linear equations and find it.	Analyse	1	1, 2, 9,12
4	Inspect the analytical method for solving differential equations and applications.	Analyse	2	1, 2, 9,12

TEXT BOOKS:

1. N. P. Bali, K. L. Sai Prasad, "A Textbook of Engineering Mathematics I, II, III", 2nd Edition Universal Science Press, New Delhi, 2018.
2. B. S. Grewal, "Higher Engineering Mathematics", 44 Edition, Khanna Publishers, 2018.

REFERENCE BOOKS:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", 10th Edition, John Wiley & Sons, Inc, 2010.

2. H. K. Dass and Er. RajanishVerma, "Higher Engineering Mathematics", 3rd revised edition, S. Chand & Co., 2015.

3. B. V. Ramana, "Advanced Engineering Mathematics", TMH Publishers.

4. T. K. V. Iyengar et al, "Engineering Mathematics, I, II, III", S. Chand & Co., New Delhi, 2018.

22CT101 APPLIED CHEMISTRY

Hours Per Week :

L	T	P	C
2	0	2	3

PREREQUISITE KNOWLEDGE: Concept of bonding, chemical reactions and organic dyes.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers the student's knowledge on biological basis of nutrition, metabolic pathways, enzyme activity and mechanisms by which diet can influence health. The objective of this course is to empower the students with methods and techniques for molecular weight estimation of proteins, qualitative analysis of edible fats and oils and make nutrient profiles for balanced diet and health.

Source : https://www.dreamstime.com/photos-images/applied-chemistry.html

MODULE-1

UNIT-1   **8L+0T+8P=16 Hours**

CHEMICAL BONDING &NANOMATERIALS:

Chemical bonding:Types of Bonds: ionic, covalent, metallic and mechanical bonds; Crystal field theory of octahedral and tetrahedral complexes, Molecular orbital theory of diatomic molecules (O_2 and CO).

Nanomaterials : Introduction, Classification, Properties, Top-down and Bottom-up synthetic methods, Synthesis, Properties andPotential applications of Carbon Nanotubes, Graphene.

UNIT-2   **8L+0T+8P=16 Hours**

INSTRUMENTAL TECHNIQUES:

Electronic spectroscopy: Principle, Electronic transitions, Chromophore and Auxochrome, Beer-Lambert's law derivation and limitations, Instrumentation of UV-Visible spectrophotometer, Quantitative & qualitative applications.

IR spectroscopy: Types of vibrations;Vibrational degrees of freedom, Instrumentation of IR spectrophotometer and Applications.

X-ray Diffraction: Introduction; Principle, Bragg's equation, and Potential applications.

PRACTICES:

- Synthesis of Iron oxide nanoparticles.
- Synthesis of Au/Ag nanoparticles using plant extract (Azadirachtaindica or Neem) leaves and characterization by UV-Visible Spectroscopic technique.
- Characterization of prepared nanomaterials using XRD.
- Synthesis of Tetraamminecopper(II) sulfate
- Determination of Mn^{7+} by colorimetry.
- Simultaneous determination of Cr (VI) &Mn (VII) by UV-Visible spectrophotometry.

MODULE-2

UNIT-1   **8L+0T+0P=08 Hours**

POLYMERS:

Introduction, Classification, Molecular weight determination, (M_w &M_n) Types of polymerization, Preparation, properties and applications of PE, PMA, Nylon-6,6; Rubber-vulcanization, Synthetic rubbers – Buna-S, Neoprene.

UNIT-2   **8L+0T+8P=16 Hours**

DYES & PIGMENTS:

Dyes:Introduction to color science, Adsorption and scattering of light, Dyes-Nomenclature, Classification of Dyes – based on chemical compositionand applications.

Pigments:History of pigments, Classification of pigments, Influence of physical structure on color; Color index, Properties and applications of pigments, Toxicity of pigments, Green pigments.

PRACTICES:

- Synthesis of Bakelite.
- ye adsorption/degradation using nanomaterials.
- Chemistry of Blue printing.
- Synthesis of ancient paints/ traditional & indigenous paints.
- Synthesis of Indigo.
- Impacts of dyes in Environment.
- Preparation of Urea-Formaldehyde resin and characterization by IR.
- Preparation polyurethane and characterization by IR.
- Preparation of Nylon-6,6 and characterization by IR.
- Synthesis of Magneson II and characterization by UV & IR.
- Synthesis of Solochrome Orange M and characterization by UV & IR.
- Pigment Extraction and Separation by Paper Chromatography.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Apply different bonding theories to predict the properties of small molecules.	Apply	1	1, 2, 9, 10, 11, 12
2	Identify various synthetic approaches of nanomaterials for specific applications.	Apply	1	1, 2, 3, 6, 9, 10, 11, 12
3	Analyze properties of various nanomaterials using spectroscopic techniques for the engineering.	Analyze	1	1, 2, 3, 4, 5, 9, 10, 11, 12
4	Distinguish various types of synthetic approaches of polymers for their specific engineering applications.	Analyze	2	1, 2, 9, 10, 11, 12
5	Recommend the use of dyes and pigments in the industrial applications.	Evaluate	2	1, 2, 6, 7, 8, 9, 10, 11, 12

TEXT BOOKS:

1. S.Chawala, "A Textbook of Engineering Chemistry Engineering Materials and Applications", Dhanpat Rai Publications, 3rd Edition, 2015.
2. P.C. Jain and M. Jain, "Engineering Chemistry", Dhanpat Rai Publications, 17thEdition, 2015.

REFERENCEBOOKS:

1. K.S. Maheswaramma and M. Chugh, "Engineering Chemistry", Pearson, 1st Edition, 2015.
2. B. S.Bahl, ArunBahl and B. D.Tuli, "Essentials of Physical Chemistry",S. Chand and Co. Ltd., 2007.
3. G. Raj and C.Anand, "Instrumental Methods of Analysis", Himalaya Publications, 5th edition, 2007.
4. T. Pradeep, "Nano: The Essentials; Understanding of Nano Science and Technology" Tata McGraw-Hill, New Delhi, 2012.
5. J. Mendham, R. C. Denney, J. D. Bares, M. Thomas and B. Siva Sankar, "Vogel's Textbook of Qualitative Chemical Analysis" (vol. 1), Pearson Publications, 2009.

22EE101 BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

Hours Per Week :

L	T	P	C
2	0	2	3
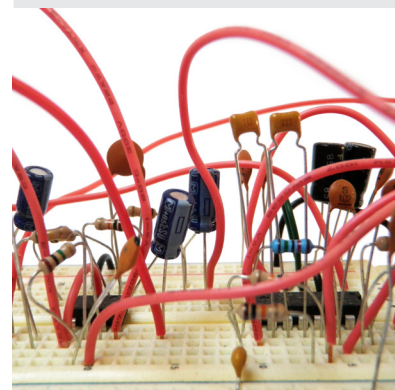
PREREQUISITE KNOWLEDGE: Electrostatics and Electromagnetism.

COURSE DESCRIPTION AND OBJECTIVES:

This course provides an insight into the functioning of basic electrical components like resistor, inductor and capacitor. It deals with the constructional and operational details of AC machines. It also deals with the basic electronic components like P-N junction diode, Zener diode, Transistor and their characteristics.

MODULE-1

UNIT-1   **8L+0T+8P=16 Hours**

FUNDAMENTALS OF ELECTRIC CIRCUITS:

DC Circuits: Concept of network, Active and passive elements, Voltage and current sources, Concept of linearity and linear network, Unilateral and bilateral elements, R, L and C as linear elements, Ohm's Law, Kirchhoff's Laws, Application to simple series, Parallel circuits, Mesh and nodal analysis of resistive circuits with DC source.

AC circuits: Generation of AC voltage, Frequency, Average value, R.M.S. value, Form factor, Peak factor for sinusoidal only.

UNIT-2   **8L+0T+8P=16 Hours**

SEMICONDUCTOR DEVICES:

Classification of semiconductors, P-N junction diode -operation and its characteristics, Half wave rectifier - operation, efficiency; Full wave rectifiers -types, operation, efficiency; Zener diode and its characteristics, Zener diode as Voltage regulator.

Bi polar junction transistor- operation, types (NPN & PNP).

PRACTICES:

- Verification of Ohm's law.
- Verification of Kirchhoff's current law.
- Verification of Kirchhoff's voltage law.
- Determination of R.M.S. Values of sinusoidal waveform.
- Verification of PN junction diode characteristics under both forward and reverse bias.
- Verification of Zener diode characteristics under reverse bias.

MODULE-2

UNIT-1   **8L+0T+8P=16 Hours**

ANALYSIS OF AC CIRCUITS:

Analysis of single- phase ac circuits consisting of R, L, C, RL, RC (series and parallel) (simple numerical problems). Introduction to three phase system, Relation between phase and line quantities of voltages and currents in star and delta connected systems (Elementary treatment only).

UNIT-2   **8L+0T+8P=16 Hours**

AC MACHINES:

Electromagnetism: Concepts of Magneto motive force, Reluctance, Flux and flux density, Concept of self-inductance and mutual inductance, Coefficient of coupling.

Static & Rotating AC Machine: Principle of operation of single phase transformer, Constructional features, EMF equation (simple numerical problems).

Rotating AC Machine Principle of operation of three phase induction motor, Slip ring and squirrel cage motors, Torque equation; Constructional details of synchronous machine.

PRACTICES:

- Transformation ratio of a single phase transformer at different loads.
- Measurement of Energy in single phase resistive load circuit.
- Measurement of Power in single phase resistive load circuit
- Determination of impedance in complex AC circuits.
- Verification of line and phase quantities in a balanced three phase system.

COURSE OUTCOMES:

Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Solve the AC (single and three phase) and DC circuits using different methods.	Apply	1, 2	1, 2, 9,12
2	Apply the concepts of electromagnetism for its applications.	Apply	2	1, 2, 3, 9,12
3	Analyze the resistive circuits with independent sources and find its solution.	Analyze	1, 2	1, 2, 6, 9
4	Examine the different electrical equipment.	Evaluate	2	1, 2, 9,12
5	Acquire the knowledge of semiconductor devices to create circuits.	Create	1	1, 2, 3, 9,12

TEXT BOOKS:

1. V. K. Mehta, "Principles of Electrical Engineering and Electronics", S.Chand& Co., Publications, New Delhi, 2019.
2. D.P. Kothari, "Basic Electrical and Electronics Engineering", TMH, New Delhi, 2017.

REFERENCE BOOKS:

1. Millman and Halkias, "Electronic Devices and Circuits", Mc Graw Hill, 2006.
2. A.K. Thereja and B.L.Thereja, "Electrical Technology", Vol.–II, S. Chand & Co., Publications, 2020.
3. U. Bakshi and A. Bakshi, "Basic Electrical Engineering", 1st edition, Technical Publications, Pune, Nov 2020.

22TT102 IT WORKSHOP AND TEXTILE ENGINEERING PRODUCTS

Hours Per Week :

L	T	P	C
1	0	4	3
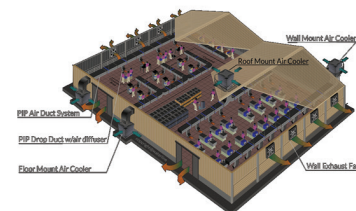
PREREQUISITE KNOWLEDGE: Basics of computers and engineering products.

COURSE DESCRIPTION AND OBJECTIVES:

This course deals with different IT tools and textile equipment. The objective of this course is giving hands on practice on assembling and disassembling, productivity tools like Latex, word, spreadsheets and presentations and to develop models using Carpentry, Fitting, Tinsmith, House wiring.

MODULE - 1

UNIT-1   **4L+0T+16P=20 Hours**

IT WORKSHOP:

Computer Hardware: peripherals of a computer, components in a CPU and its functions, block diagram of the CPU

Tools for Report writing and Presentation: Overview and Installation of Microsoft Word, Excel and PowerPoint Presentation

UNIT-2   **4L+0T+16P=20 Hours**

COMPUTER HARDWARE:

Computer Hardware: Disassemble and Assemble the PC back to working condition

Tools for Report writing and Presentation: Creating project, creating a Newsletter using Microsoft Word and LaTeX.

Creating a Scheduler, Calculating GPA, Performance Analysis, Conditional Formatting, Charts and Pivot Tables using MS Excel; Power Point utilities and tools, Master Layouts, Design Templates, Background and textures using Power Point Presentation

PRACTICES:
- Troubleshooting of a computer Hardware.
- Assembly and Disassembly of a Computer.
- Creation of projects and Newsletter using MS Word and LaTeX.
- Spreadsheet basics, modifying worksheets, formatting cells, formulas and functions, sorting and filtering, charts using MS Excel.
- Power point screen, working with slides, add content, work with text, working with tables, graphics, slide animation, reordering slides, adding sound to a presentation using MS PPT.

MODULE - 2

UNIT-1   **4L+0T+16P=20 Hours.**

BASIC ENGINEERING:

Engineering Materials: Introduction, Classification, Ferrous & non-ferrous metals and alloys

Trades: Introduction and Materials used in Carpentry, Fitting, Tin smithy and House Wiring. Cutting Tools, Holding Tools, Marking Tools used and types of joints made in Carpentry, Fitting, Tin smithy and House Wiring.

SKILLS:

✓ *Design and develop various sheet metal products.*

✓ *Analyse the functioning & troubleshoots of household appliances.*

✓ *Create products by using different trades for Industrial applications.*

UNIT-2   **2L+0T+22P=24 Hours**

INDUSTRIAL EQUIPMENT:

Air conditioners, Refrigerator, Pumps, & Boilers: Working principle of Air Conditioner, Refrigerator, washing machine, Industrial Dryers, Centrifugal, Reciprocating pumps and Boiler for Textile Industry.

PRACTICES:

- Fabrication of T-lap joint using carpentry tools.
- Fabrication of V-fit using fitting tools.
- Fabrication of truncated cylinder using tin smith tools.
- Performance of 1 lamp controlled by one-way switch using house wiring.
- Performance of 2 lamp controlled by one-way switch using house wiring.
- Demonstration of modelling & functioning of air-conditioners.
- Demonstration of modelling & functioning of refrigerators.
- Functioning and assembly of boilers.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Assemble and disassemble of a computer.	Apply	1	1,2,6,9
2	Create documents, spread sheets and presentations using LaTeX and MS Tools.	Apply	1	1,2,9,12
3	Fabricate different models using workshop trades.	Apply	2	1,2,3,9,12
4	Analyse the functioning of industrial appliances.	Analyse	2	1,2,9,12

TEXT BOOKS:

1. Peter Norton, "Introduction to Computers", Tata Mc Graw Hill Publishers, 7th Edition, 2017.
2. Felix W "Basic Workshop Technology: Manufacturing Process", 1st Edition, 2019.

REFERENCES:

1. T.V.Gopal, T.Kumar and G. Murali, "A first Course on Workshop Practice: Theory, Practice and Work Book", Suma Publication, 2005.
2. K.V.N.Pakirappa, "Workshop Technology", 5 th edition, Radiant Publishing House, 2011.
3. S.K Hazra Choudhury, "Elements of Work Shop Technology", 11th edition, Media Promoters, 1997.

22TP103 PROGRAMMING IN C

Hours Per Week :

L	T	P	C
2	0	4	4

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PREREQUISITE KNOWLEDGE: Fundamentals of Problem Solving.

COURSE DESCRIPTION AND OBJECTIVES:

This course is aimed to impart knowledge on basic concepts of C programming language and problem solving through programming. It covers basic structure of C program, data types, operators, decision making statements, loops, functions, strings, pointers, and also file manipulations. At the end of this course, students will be able to design, implement, test and debug complex problems using features of C.

MODULE- 1

UNIT-1   **8L+0T+16P=24 Hours**

INTRODUCTION TO ALGORITHMS AND PROGRAMMING LANGUAGES:

Introduction to Algorithms: Basics of algorithms; Flow charts; Generations of programming languages. Introduction to C: Structure of a C program - pre-processor statement, inline comments, variable declaration statements, executable statements; C Tokens - C character set, identifiers and keywords, type qualifiers, type modifiers, variables, constants, punctuations and operators.

Data Types and Operators: Basic data types; Storage classes; Scope of a variable; Formatted I/O; Reading and writing characters; Operators - assignment, arithmetic, relational, logical, bitwise, ternary, address, indirection, sizeof, dot, arrow, parentheses operators; Expressions - operator precedence, associative rules.

Control Statements: Introduction to category of control statements; Conditional branching statements - if, if– else, nested-if, if – else ladder, switch case; Iterative statements - for, while, do - while, nested loops; Jump statements - break, jump, goto and continue.

UNIT-2   **8L+0T+16P=24 Hours**

ARRAYS & STRINGS:

Arrays: Introduction; Types of arrays; Single dimensional array - declaration, initialization, usage, reading, writing, accessing, memory representation, operations; Multidimensional arrays.

Strings: Character array, Reading string from the standard input device, Displaying strings on the standard output device, Importance of terminating a string, Standard string library functions.

PRACTICES:

Questions on Data Handling – Level 1:

- Write a program to accept a character as input from the user and print it.
- Write a program to accept a number as input from the user and print it.
- Write a program to accept a float value from the user and print it.
- Write a program to accept a message as input from the user and print it.
- Write a program to accept a message from the user as input and print it in 3 different lines.
- Write a program to accept 2 numbers from the user as input and print their sum.
- Write a program to accept 2 numbers from the user as input and print their product.
- Write a program to accept a number as input from the user which denotes the temperature in Celsius, convert it to Fahrenheit reading and print it.

- Write a program to accept a number as input from the user which denotes the radius and print the area of the circle.
- Write a program to accept a character as input from the user and print it's corresponding ASCII value.

Questions on Control Statements - Looping – Level 1:

- Write a C program to print all the characters from a to z once.
- Write a C program to print all the characters from Z to A once.
- Write a C program to print all the characters from A to Z 3 times.
- Write a C program to print the first N natural numbers, where N is given as input by the user.
- Write a C program to print the first N natural numbers and their sum, where N is given as input by the user.
- Write a C program to print all the odd numbers between 1 and N where N is given as input by the user.
- Write a C program to print all the even numbers between I and N where N is given as input by the user.
- Write a C program to print the squares of the first N natural numbers between 1 and N, where N is given as input by the user.
- Write a C program to print the cubes of the first N natural numbers between 1 and N, where N is given as input by the user.
- Write a C program to print the squares of every 5th number starting from 1 to N, where N is given as input by the user.

Questions on Control Statements – Decision Making – Level 1:

- Write a program to accept two numbers as input check if they are equal.
- Write a program to accept two characters as input and check if they are equal.
- Write a program to accept two numbers as input and print the greater of the 2 numbers.
- Write a program to accept two numbers as input and print the lesser of the 2 numbers.
- Write a program to accept 3 numbers as input and print the maximum of the 3.
- Write a program to accept 3 numbers as input and print the minimum of the 3.
- Write a program to accept a number as input and print EVEN if it is an even number and ODD if it is an odd number.
- Write a program to accept a number as input and check if it is divisible by 3. If it is divisible by 3 print YES else print NO.
- Write a program to accept a number as input and check if it is divisible by both 3 & 5. If it is divisible print YES else print NO.
- Write a program to accept a number as input and check if it is positive, negative or zero.

Questions on Patterns – Level 1:

- Write a program to accept a number N as input from the user and print the following pattern. Sample N = 5.

  ```
  *****

  *****

  *****

  *****

  *****
  ```

- Write a program to accept a number N as input from the user and print the following pattern. Sample N = 5.

  ```
  *****

  *    *

  *    *

  *    *

  *****
  ```

- Write a program to accept a number N as input from the user and print the following pattern. Sample N = 5.

  ```
  *
  **
  ***
  ****
  *****
  ```

- Write a program to accept a number N as input from the user and print the following pattern. Sample N = 5.

  ```
      *
     **
    ***
   ****
  *****
  ```

- Write a program to accept a number N as input from the user and print the following pattern. Sample N = 5.

  ```
  1
  12
  123
  1234
  12345
  ```

- Write a program to accept a number N as input from the user and print the following pattern. Sample N = 5.

  ```
  1
  22
  333
  4444
  55555
  ```

- Write a program to accept a number N as input from the user and print the following pattern. Sample N = 5.

  ```
  54321
  4321
  321
  21
  1
  ```

- Write a program to accept a number N as input from the user and print the following pattern. Sample N = 5.

  ```
  12345
  2345
  345
  45
  5
  ```

- Write a program to accept a number N as input from the user and print the following pattern. Sample N = 5.

  ```
  A
  AB
  ABC
  ABCD
  ABCDE
  ```

- Write a program to accept a number N as input from the user and print the following pattern. Sample N = 5.

  A

  BC

  DEF

  GHIJ

  KLMNO

Questions on Number Crunching – Level 1:

- Write a program to accept a number as input and print the number of digits in the number.
- Write a program to accept a number as input print the sum of its digits.
- Write a program to accept a number as input, reverse the number and print it.
- Write a program to accept a number and digit as input and find the number of occurrences of the digit in the number.
- Write a program to accept a number as input and check if it is an Armstrong number.
- Write a program to accept a number as input and check if it is an Adam number.
- Write a program to accept a number as input and check if is a prime number.
- Write a program to accept 2 numbers as input and check if they are amicable or not.
- Write a program to accept a number as input and check if it is a power of 2.
- Write a program to accept 2 numbers as input and find their LCM.

Questions on Arrays – Level 1:

- Print the contents of an array from the left to the right.
- Print the contents of an array from the right to the left.
- Find the sum of the elements of an array.
- Find the maximum element in an unsorted array.
- Find the minimum element in an unsorted array.
- Find the average of the elements in an unsorted array.
- Count the number of 0s and 1s in an array having 0s and 1s in random order.
- Count the number of elements in an array whose elements are lesser than a key element in an unsorted array.
- Print all the elements in an array whose values are lesser than a key element in an unsorted array.
- Find the repeated elements in a sorted array.

Questions Number crunching – Level 2:

- Write a program to accept a number as input and print the product of its digits.
- Write a program to accept a number as input and check if it is a palindrome.
- Write a program to accept a number as input and print the frequency of occurrence of each digit.
- Write a program to accept a number as input and print its factors.
- Write a program to accept a number as input and print its prime factors.
- Write a program to accept a number as input and check if it is a perfect square of not.
- Write a program to accept 2 numbers as input and check if they are betrothed numbers or not.
- Write a program to accept 2 numbers as input and print their HCF.
- Write a program to accept a number as input and check if is a strong number.
- Write a program to generate prime numbers between two intervals given as input.

Questions on Arrays – Level 2:

- Find the sum of the maximum and minimum numbers of an unsorted array.
- Replace every element in an array with the sum of its every other element.
- Replace every element in an array with the sum of its right side elements.
- Replace every element in an array with the sum of its left side elements.
- Reverse the elements of an array (in place replacement).
- Reverse the first half of an array.

- Reverse the second half of an array.
- Write a program to find the second largest element in an unsorted array.
- Write a program to find the second smallest element in an unsorted array.
- Write a program to print the number of odd and even numbers in an unsorted array.

Questions on Strings – Level 1:

- Write a program to accept a string as input and print it.
- Write a program to accept a string as input and count the number of vowels in it.
- Write a program to accept a string as input and count the number of consonants in it.
- Write a program to accept a string as input and print its length.
- Write a program to accept a string as input and print the reversed string.
- Write a program to accept 2 strings as input and check if they are the same.
- Write a program to accept a string as input and copy the contents into a second string and print the second string.
- Write a program to accept 2 strings as input and concatenate them into a third string and print the third string.
- Write a program to accept a string as input and check if it is a palindrome.
- Write a program to accept two strings as input and check if the second string is a substring of the first.

Questions on Strings – Level 2:

- Implement the string length function.
- Implement the string copy function.
- Implement the string concatenate function.
- Implement the string compare function.
- Implement the vowel count function.
- Implement the consonant count function.
- Implement the count words function.
- Implement the string reverse function.
- Implement the strstr function.
- Complete the code snippet to implement the is Palindrome function that checks if a given string is a palindrome. You will need to use the 3 functions string Copy, str Reverse and string Compare functions provided to accomplish this.

MODULE-2

UNIT-1   **8L+0T+16P=24 Hours**

FUNCTIONS & POINTERS:

User-defined functions: Function declaration - definition, header of a function, body of a function, function invocation; Call by value; Call by address; Passing arrays to functions; Command line arguments; Recursion; Library Functions.

Pointers: Declaration, Initialization, Multiple indirection, Pointer arithmetic, Relationship between arrays and pointers, Scaling up - array of arrays, array of pointers, pointer to a pointer and pointer to an array; Dynamic memory allocation functions.

UNIT- 2   **8L+0T+16P=24 Hours**

STRUCTURES, UNIONS & FILES:

Structures: Defining a structure, Declaring structure variable, Operations on structures, Pointers to structure - declaring pointer to a structure, accessing structure members using pointer; Array of structures, Nested structures, Passing structures to functions - passing each member of a structure as a separate argument, passing structure variable by value, passing structure variable by reference/ address; Typedef and structures.

Unions: Defining a union - declaring union variable, operations on union; Pointers to union - declaring pointer to a union, accessing union members using pointer; Array of union, Nested union, Typedef and union, Enumerations, Bit-fields.

Files: Introduction to files, Streams, I/O using streams – opening a stream, closing stream; Character input, Character output, File position indicator, End of file and errors, Line input and line output, Formatted I/O, Block input and output, File type, Files and command line arguments.

PRACTICES:

Questions on Strings – Level 3:

- Write a program to swap two given strings and print the swapped strings.
- Write a program to swap two given words of the given sentence and print the altered string.
- Return the maximum occurring character in the string.
- Write a program to print the character in the string with the count where count is the occurrence of the character.
- Write a program to print the duplicate characters in the given string.
- Write a program to remove the duplicate characters in the given string.
- Write a program to remove the vowels from a given string.
- Write a program to rotate a given string N number of times.
- Write a program to check if 2 strings are rotations of each other.
- Write a program to remove the characters from the first string that are present in the second string.

Questions on 2D Arrays – Level 1:

- Print the contents of a 2D array row-wise.
- Print the contents of a 2D array column-wise.
- Print the contents of a 2D array in a zig-zag order.
- Print the contents of a 2D array diagonal-wise.
- Print the contents of a 2D array right-diagonal order.
- Print the contents of a 2D array left-diagonal order.
- Print the contents of a 2D array in the upper triangular order – left top to right bottom.
- Print the contents of a 2D array in the lower triangular order.
- Find and print the maximum element along with its position in a matrix.
- Find and print the minimum element along with its position in a matrix.

Questions on 2D Arrays – Level 2:

- Find and print the maximum element of each row of a matrix.
- Find and print the minimum elements of each row of a matrix.
- Find and print the maximum element of each column of a matrix.
- Find and print the minimum element of each column of a matrix.
- Find the lowest value in the upper triangle area and the largest value in the lower triangular area of a matrix and print their product.
- Find the sum of the elements of each row and each column of a matrix and print the minimum row sum and maximum sum column.
- Write a program to find the row with the maximum number of 1's in a matrix consisting of only 0's and 1's.
- Write a program to print the quotient and remainder on dividing sum of left-top to right-bottom diagonal by sum of right-top to left-bottom diagonal.
- Write a program to print the absolute difference of the sum of major diagonal elements and the sum of minor diagonals of the given matrix.
- Write a program to search a given element in a row-wise and column-wise sorted 2D array.

Questions on 2D Arrays – Level 3:

- Write a program to find the Kth smallest element in the given matrix.
- Write a program to find the Kth largest element in the given matrix.

- Write a program to check whether the given two two-dimensional array of same dimensions are equal or not.
- Write a program to add the given two two-dimensional array of same dimensions.
- Write a program to subtract the given two two-dimensional array of same dimensions.
- Write a program to multiply the given two two-dimensional array of same dimensions.
- Write a program to sort each row of a matrix.
- Write a program to find the sum of the elements in 'Z' sequence of the given 2D array.
- Write a program to print the unique rows of the given two-dimensional array consisting of only 0's and 1's.
- Write a program to print the unique columns of the given two-dimensional array consisting of only 0's and 1's.

Questions on Files, Structures & Unions:

- Write a C program to create a struct, named Student, representing the student's details as follows: first_name, last_name, Age and standard.

  Example

  Read student data

  john

  carmack

  15

  10

  Display the data in the following format

  First Name: john

  Last Name: carmack

  Age: 15

  Standard: 10

- Declare a structure POINT. Input the coordinates of point variable and write a C program to determine the quadrant in which it lies. The following table can be used to determine the quadrant.

Quadrant	X	Y
1	Positive	Positive
2	Negative	Positive
3	Negative	Negative
4	Positive	Negative

  Example

  Input the values for X and Y coordinate: 7 9

  The coordinate point (7,9) lies in the First quadrant.

- Bob and Alice both are friends. Bob asked Alice how to store the information of the books using Structures. Then Alice written a c program to store the information of books using book structure by taking different attributes like book_name, author, book_id, price. Write a C program to read and display the attributes of the books using structures.

  Sample Input:

  Enter number of books: 1

  Enter the book name: c Programming

  Enter the author name: balaguruswamy

  Enter the book ID: 23413

  Enter the book price: 500

  Sample Output:

  The details of the book are:

  The book name is: c Programming

The author name is: balaguruswamy

The book ID is: 23413

The book price is: 500.00

- Ramesh wants to do addition on complex numbers. He did it with regular practice but Charan asked him to do with the help of structures by following below Criteria.

  Write a C program that defines a structure named 'Complex' consisting of two floating point members called "real and imaginary". Let c1 and c2 are two Complex variables; compute the sum of two variables.

  Example:

  c1= 2   8
  c2= 6   4
  Sum= 8.000000+12.000000i

- Customer Payment Details is a structure with members as customers_name, address, account_number, payment_status(paid(1)/ not_paid(0)), due_date, and amount. In this example, payment_date is another structure with month, day and year as integer members. So, every customer record can be considered as an array of structures.

  Write a C program that displays the amount to be paid by each customer along with their names. If payment_status is 1, display NIL for such customers.

  Input Format:

  First line of input contains 'n' number of customers, followed by 8 lines of input for each customer. Each line represents (customers_name, address, account_number, amount payment_status(paid(1)/ not_paid(0)), and due_date).

  Output Format:

  First line of output is Amount to be paid by each customer as on date: followed by n lines of output. Each line contains name of the customer followed by tab space, and amount to be paid.

  Hint: Use nested structure to represent date.

  Write a 'C' program to accept customer details such as: Account_no, Name, Balance using structure. Assume 3 customers in the bank. Write a function to print the account no. and name of each customer whose balance < 100 Rs.

- Write a C program to accept details of 'n' employee(eno, ename, salary) and display the details of employee having highest salary. Use array of structure.

- Write a C program to print the bill details of 'N' number of customers with the following data: meter number, customer name, no of units consumed, bill date, last date to deposit and city. The bill is to be calculated according to the following conditions:

No. of units	Charges
For first 100 units	Rs.0.75 per unit
For the next 200 units	Rs.1.80 per unit
For the next 200 units	Rs.2.75 per unit

  Sample Input

  Enter no. of customers

  1

  Enter Meter Number AP01213

  Enter Customer Name: Karthik

  Enter No. of units consumed: 200

  Enter Bill date:22/01/2021

  Enter Last date: 12/2/2021

  Enter City: Guntur

  Sample Output

  Meter Number AP01213

  Customer Name: Karthik

No. of units consumed: 200

Bill date:22/01/2021

Last date: 12/2/2021

City: Guntur

Total Amount: 255.000000

- Write a C program that creates a student file containing {Roll No, Student Name, Address, Stream}, where the data will be inserted and display the list of students who are in CSE (Stream=CSE).

  Input: A file name

  Output: The attributes such as Roll_No, Student_Name, Stream, Address.

  Sample Input

201fa4200	Raja	CSE	Guntur
201fa4201	Bala	IT	Tenali

  Sample Output

201fa4200	Raja	CSE	Guntur

- Write a C program that reads content from an existing text file and write the same in a new file by changing all lowercase alphabetic character to upper case. (Existing file may contain digit and special characters).

  Example:

  Input: Enter the file name.

  Output: New file with updated content.

- Write a C program to count the occurrences of the given string in a file.

  Example:

  Input: Enter the File name to read the string to be counted.

  Output: Display the count of occurrences of the string.

- Write a C Program to transfer the data from one location to another location without changing the order of the content.

  Example:

  Read the file name from the user. If the source file exists, Transfer the data and display the message as "Data is transferred successfully" otherwise display the message "No such file is existing in the directory."

- Write a C program that reads numbers and write them into a text-file. Also find odd and even numbers in that file and store it in 2 separate files named odd.txt and even.txt. All the values should be in ascending order.

  Input: Enter the values.

  Output: Creates a separate file for Even and Odd numbers.

  Sample Input:

  4 43 2 53 45

  Sample Output:

  Even.txt: 2 4

  Odd.txt: 43 45 53

- Write a C program to replace the content in the given text file.

  Input: Enter the file name, line number to be replaced and the new content

  Output: New file with replaced lines.

  Example:

  Sample Input: Enter the file name: abc.txt

  Enter the line no to replace: 3

  Enter the content: Files stores data presently.

Sample Output:

Line no 3 is replaced with the given content.

The content of the file abc.txt contains:

test line 1

test line 2

Files stores data presently

test line 4

COURSE OUTCOMES:

Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Identify suitable data type for operands and design of expressions having right precedence.	Apply	1, 2	1
2	Apply decision making and iterative features of C Programming language effectively.	Apply	1, 2	1
3	Select problem specific data structures and suitable accessing methods.	Analyze	1, 2	1, 2
4	Design and develop non- recursive and recursive func-tions and their usage to build large modular programs and also able to design string manipulation functions.	Create	1, 2	3
5	Develop C programs that are understandable, debug-gable, maintainable and more likely to work correctly in the first attempt.	Evaluate	1, 2	3, 4

TEXT BOOKS:

1. Behrouz A. Forouzan, Richard F.Gilberg, "Programming for Problem Solving", 1st edition, Cengage publications, 2019.

2. Ajay Mittal, "Programming in C - A Practical Approach", 1st edition, Pearson Education, India, 2010.

REFERENCE BOOKS:

1. Reema Thareja, "Computer Fundamentals and Programming in C", 1st edition, Oxford University Press, India, 2013.

2. Herbert Schildt, "C: The Complete Reference", 4th edition, Tata McGraw-Hill, 2017.

3. Byron S Gottfried, "Programming with C", 4th edition, Tata McGraw-Hill, 2018.

22EN102 ENGLISH PROFICIENCY AND COMMUNICATION SKILLS

Hours Per Week :

L	T	P	C
0	0	2	1

PREREQUISITE KNOWLEDGE: Basics of grammar, Read and understand for global context, Cultural sensitivity and Basic writing skills.

COURSE DESCRIPTION AND OBJECTIVES:

English Proficiency and Communication Skills seeks to develop the students' abilities in grammar, speaking, reading, writing and overall comprehension skills. The course will provide students an exposure on a wide range of language use in everyday situations. It will make the students to equip with functional English and make them use it confidently in their professional and social contexts. Finally, students will strengthen their reading, writing, listening and speaking skills in English

MODULE-1

UNIT-1   **0L+0T+8P=08 Hours**

MY LIFE AND HOME – MAKING CHOICES – HAVING FUN:
Reading: Understanding main message, factual information global meaning, specific information and paraphrasing.
Writing: Developing hints based mail, Writing short messages/paragraphs.
Listening: Understanding short monologues or dialogues and choose the correct visual.
Speaking: Express simple opinions /cultural matters in a limited way.
Vocabulary: Discerning use of right word suiting the context, B1 Preliminary word list.
Grammar: Frequency Adverbs, State Verbs, AFV and Prepositions.

UNIT-2   **0L+0T+8P=08 Hours**

ON HOLIDAY - DIFFERENT FEELINGS – THAT'S ENTERTAINMENT!:

Reading: Longer text for detailed comprehension, gist and inference.
Writing: Developing notes and responding to penfriends or 'e-pals'.
Listening: Understand straightforward instructions or public announcements.
Speaking: Describing people, things and places in a photograph.
Vocabulary/Grammar: Comparatives and Superlatives, Gradable and non-gradable adjectives, Cloze tests.

PRACTICES:
- Developing hints based mail.
- Writing short message.
- Writing paragraphs.
- Expressing opinions and cultural matters.
- Understanding short monologues.
- Understanding straightforward instructions and public announcements.
- Describing people, things and places in a photograph.

MODULE-2
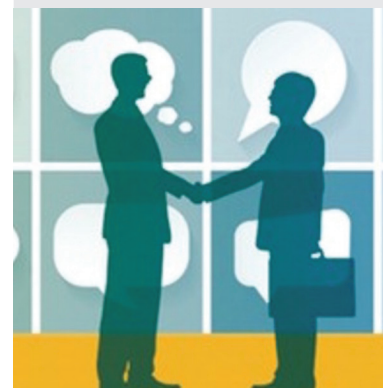
UNIT-1   **0L+0T+8P=08 Hours**

GETTING AROUND – INFLUENCES - STAY FIT AND HEALTHY:
Reading: Reading for understanding coherence of the text and drawing inferences.
Writing: Reading an announcement from a magazine or website for preparing an article.

SKILLS:

✓ *Use of appropriate grammar and vocabulary with syntactic patterns in short texts.*

✓ *Read and extract the main message, global meaning, specific information, detailed comprehension, understanding of attitude, opinion and writer purpose and inference.*

✓ *Listen to understand key information, specific information, gist and detailed meaning and to interpret meaning.*

✓ *Understand questions and make appropriate responses and talk freely on everyday topics.*

Listening: Discussion activities and listening to understand the gist of each short dialogue.

Speaking: Snap Talks, Make and respond to suggestions, discuss alternatives and negotiate agreement.

Vocabulary / Grammar: Punctuation, Prepositions, Phrasal Verbs, B1 Preliminary word list.

UNIT-2   **0L+0T+8P=08 Hours**

LOOKS AMAZING! – THE NATURAL WORLD – EXPRESS YOURSELF!:

Reading: Content, Communicative Achievement, Organisation and Language.

Writing: Developing a story with clear links to the given opening sentence.

Listening: An interview for a detailed understanding of meaning and to identify attitudes and opinions.

Speaking: Discuss likes, dislikes, experiences, opinions, habits, etc.

Vocabulary/Grammar: Modals, Conditionals, Verb forms (Time and Tense).

PRACTICES:

- Listening to understand the gist of each short dialogue.
- Listening to an interview for a detailed understanding of meaning and to identify attitudes and opinions.
- Preparing an article.
- Discuss for alternatives and negotiate agreement.
- Discussion on likes, dislikes, experiences, opinions, habits, etc.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mod- ule No.	Mapping with POs
1	Apply to read and grasp content on a range of topics/ texts related to their everyday life like notifications, advertisements, travel brochures, news reports, articles.	Apply	1	7, 8, 9, 10, 12
2	Apply suitable strategies to achieve comprehension, like listening for main points and checking comprehension using contextual clues etc.	Apply	1	7, 8, 9, 10, 12
3	Demonstrate vocabulary beyond that of the familiar subjects.	Analyze	1, 2	7, 8, 9, 10, 12
4	Show sufficient control of English grammar and sentence variety to coherently organise information at sentence and discourse levels.	Evaluate	2	7, 8, 9, 10, 12
5	Use functional English to communicate and interact effectively in everyday situations.	Create	2	7, 8, 9, 10, 12

TEXT BOOKS:

1. Emma Heyderman and Peter May, "Complete Preliminary", Student's Book with Answers, 2nd edition, Cambridge University Press, 2019.

REFERENCE BOOKS:

1. Annette Capel and Rosemary Nixon, "Introduction to PET", Oxford University Press, 2009.
2. Adrian Doff and Craig Thaine, "Empower Pre intermediate", Cambridge University Press, 2015.
3. Louise Hashemi and Barbara Thomas, "Objective PET", Cambridge University Press, 2010.

22TP101 CONSTITUTION OF INDIA

Hours Per Week :

L	T	P	C
0	2	0	1

PREREQUISITE KNOWLEDGE: High School-level Civics and Social Studies.

COURSE DESCRIPTION AND OBJECTIVES:

To provide students with a basic understanding of Indian Polity and Constitution and make students understand the functioning of government at the center and state level besides local self-government. This course also equips students with knowledge pertaining to fundamental rights and fundamental duties of a citizen in a democracy such as India.

Source: https://gumlet.
assettype.com/swara-
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4aca-b229-
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75&auto=format%2
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MODULE-1

UNIT-1   **0L+8T+0P=08 Hours**

HISTORICAL BACKGROUND TO THE INDIAN CONSTITUTION:

Meaning of the constitution law and constitutionalism; Historical perspective of the Constitution of India; Salient features and characteristics of the Constitution of India.

UNIT-2   **0L+8T+0P=08 Hours**

FUNDAMENTAL RIGHTS, DUTIES, DIRECTIVE PRINCIPLES, AND AMENDMENT:

Scheme of the fundamental rights - scheme of the Fundamental Right to Equality; scheme of the Fundamental Right to certain Freedom under Article 19; scope of the Right to Life and Personal Liberty under Article 21; Scheme of the Fundamental Duties and its legal status; Directive Principles of State Policy – its importance and implementation; Amendment of the Constitution - Powers and Procedure.

PRACTICES:

- Enactment of Constituent Assembly debates to further understand the rationale for the provisions of the constitution.
- Fundamental Rights in our popular culture - discussion in the movie Jai Bhim.

MODULE-2

UNIT-1   **0L+8T+0P=08 Hours**

STRUCTURE AND FORM OF GOVERNMENT:

Federal structure and distribution of legislative and financial powers between the Union and the States; Parliamentary Form of Government in India – The constitution powers and status of the President of India; Emergency Provisions: National Emergency, President Rule, Financial Emergency.

UNIT-2   **0L+8T+0P=08 Hours**

LOCAL SELF GOVERNMENT:

Local Self Government – Constitutional Scheme in India – 73rd and 74th Amendments.

PRACTICES:

- Debate on federalism in India.
- Collect news published in the local papers about panchayats in the nearby areas.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Analyse major articles and provisions of the Indian constitution.	Analyze	1	6
2	Appreciation for the constitution and safeguarding individual rights.	Apply	1	6
3	Evaluating functions of various organs of the State in a democracy.	Evaluate	2	6

TEXTBOOK:

1. PM Bhakshi, "Constitution of India", 15th edition, Universal Law Publishing, 2018.
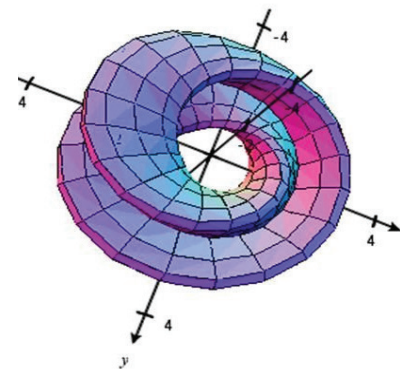
REFERENCE BOOKS:

1. B. R. Ambedkar, "The Constitution of India" Educreation Publishing, India, 2020.
2. Subhash Kashyap, "Our Constitution" 2nd edition, National Book Trust, India, 2011.
3. Arun K. Thiruvengadam, "The Constitution of India: A Contextual Analysis", Hart Publishing India, 2017.

22MT112 PARTIAL DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

Hours Per Week :

L	T	P	C
3	2	0	4

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PREREQUISITE KNOWLEDGE: Differentiation, Integration, Vectors.

COURSE DESCRIPTION AND OBJECTIVES:

The goal of this course is to build an ability of understand how partial differential equations arise in the mathematical description of heat flow and vibration. The methods to explain the physical interpretations of common forms of PDEs and solution for initial boundary value problems will be the primary focus. Students will gain deeper knowledge of multiple differentiation operations such as Gradient, Divergent and Curl. Students will learn series solution techniques, applications of PDEs in various disciplines of study and master in solving of Bessel's and Legendre's differential equations.

MODULE-1

UNIT-1   **12L+8T+0P=20 Hours**

PARTIAL DIFFERENTIAL EQUATIONS:

Partial differential equations: Order and degree, Formation of partial differential equations, Lagrange linear equations, Method of multipliers.

Classification of Second Order PDE, Method Separation of variables.

UNIT-2   **12L+8T+0P=20 Hours**

APPLICATIONS AND NUMERICAL METHODS:

Solution to one dimensional wave equation, heat equation and Laplace's equation.

Numerical Methods: Numerical methods to solve Laplace's equation: Standard five-point formula, Diagonal five-point formula (Liebmenn's iteration process).

PRACTICES:

- Learn method of forming partial differential equations.
- Identify and apply different methods to solve differential equations.
- Determine the displacement of a vibrational string is initially at rest in equilibrium position.
- Evaluate the temperature distribution in insulated rods.
- Determine solutions of Laplace equation.

MODULE-2

UNIT-1   **12L+8T+0P=20 Hours**

VECTOR CALCULUS:

Vector Differentiation:Scalar and vector point functions, Differentiation of vector functions, Gradient, Divergence, Curl.

Vector Integration: Introduction to multiple integrals (Review), Line integral, Surface integral, Volume integral.

UNIT - 2   **12L+8T+0P=20 Hours**

APPLICATIONS OF VECTOR CALCULUS:

Normal vector, Directional Derivate, Solenoidal and Irrotational flow.

Green's theorem for plane, Gauss divergence theorem, Stokes' theorem (without proofs).

PRACTICES:

- Compute the work done when an object moves along the path subject to a force.
- Use divergence and curl to measure the tendency of the fluid to collect or disperse at a point and the tendency of the fluid to swirl around the point.
- Compute the flux of a vector per unit time flowing across in the direction of a vector.
- Verify Green's theorem, stokes theorem and Divergence theorem for the functions over a region.
- Compute the tangent vector to a curve in space.
- Compute the directional derivative of a scalar point function at a point.
- Compute any integral which is to be evaluated over a curve, over a surface or over a volume.

COURSEOUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Apply Green's theorem for plane, Gauss divergence theorem, Stokes' theorem.	Apply	2	1, 2, 4, 9, 12
2	Apply the numerical methods to solve Laplace's equation.	Apply	1	1, 2, 4, 9, 12
3	Evaluate the line integrals, surface integrals and volume integrals.	Evaluate	2	1, 2, 4, 9, 12
4	Evaluate differential operators and the solutions of first order and some second order partial differential equations.	Evaluate	1	1, 2, 4, 9, 12

TEXT BOOKS:

1. N. P. Bali, K. L. Sai Prasad, A Textbook of Engineering Mathematics I, II, III, 2nd Edition, Universal Science Press, New Delhi, 2018.
2. B. S. Grewal, Higher Engineering Mathematics, 44th Edition, Khanna Publishers, 2018.

REFERENCE BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley and Sons, Inc,
2. H. K. Dass and Er. Rajanish Verma, Higher Engineering Mathematics, S. Chand and Co., Third revised edition, 2015.
3. B. V. Ramana, Advanced Engineering Mathematics, TMH Publishers.
4. T. K.V. Iyengar et al: Engineering Mathematics, I, II, III, S. Chand and Co., New Delhi, 2018.

22PY102 ENGINEERING PHYSICS

Hours Per Week :

L	T	P	C
2	0	2	**3**

PREREQUISITE KNOWLEDGE: Atomic structure, electronic transitions, Bonding in solids and wave optics.

COURSE DESCRIPTION AND OBJECTIVES:

The course is aimed at realizing the concept of waves in understanding the applications of ultrasonics and quantum optics in lasers. It imparts knowledge on distinguishing crystal structures and synthesis of nanomaterials and their characterization.

MODULE-1

UNIT-1   **8L+0T+8P=16 Hours**

WAVES & OSCILLATIONS:

Simple harmonic motion & Free oscillations- Equation of motion-Energy expressions; Damped oscillations-Differential equation-different cases of damping-logarithmic decrement-relaxation time-quality factor; Forced oscillations-Difference between free and forced oscillations-equation of motion-expression for amplitude and phase; Resonance and its examples.

Ultrasonics: Introduction –properties of ultrasonic waves-Production of ultrasonic waves by Piezoelectric method-Determination of velocity of ultrasonic waves in liquids-Interferometer method-NDT-Ultrasonic testing & X-ray radiography.

UNIT-2   **8L+0T+8P=16 Hours**

LASER:

Introduction to Laser- population inversion and pumping methods-CO_2 laser-

Laser applications in industry and scientific research. Holography-construction of hologram-reconstruction of image and applications.

Fiber Optics: Introduction-Classification-Step and Graded index fibers- Acceptance angle-Numerical aperture- Fibers optic sensors and types of sensors.

PRACTICES:

- Melde's experiment- Determination of frequency of a given tuning fork
- Ultrasonic Interferometer-Determination of the velocity of ultrasonic waves in liquids
- Semiconductor laser- Determination of wavelength
- Optical fibers- Determination of Numerical Aperture and Acceptance angle.

MODULE-2

UNIT-1   **8L+0T+8P =16 Hours**

CRYSTAL PHYSICS

Fundamental terms of crystal Physics-Lattice parameters- Crystal Systems-Packing factor for SC, BCC and FCC - Miller indices-Important planes of cubic crystal system-Distance of separation between successive (h k l) planes- X-ray diffraction –Bragg's law - Defects in solids- Point defects- Line defects-Edge & Screw dislocations.
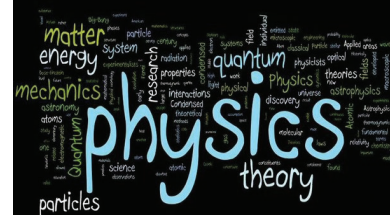
UNIT-2   **8L+0T+8P=16 Hours**

NANOMATERIALS AND THEIR CHARACTERIZATION:

Introduction to nanoscience and technology-surface area to volume ratio & quantum confinement; Synthesis of nanomaterials Top-down & Bottom-up approach, Ball milling- Sol-Gel method; Applications of nanotechnology in various fields; X-Ray Diffraction-Bragg's law -Powder method- Electron microscopy-(SEM &TEM); Atomic force microscopy (AFM).

PRACTICES:

- Semiconductor- Determination of Bandgap.
- Diffraction grating- Determination of wavelength of a given light source.
- Photoelectric effect- Determination of Planks constant.

COURSEOUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Apply the knowledge of crystal geometry to distinguish solids.	Apply	2	3, 4, 5,
2	Analyse the knowledge of mechanical and sound waves from the perspective of engineering applications.	Analyse	1	1, 2, 3, 4
3	Analyse the wavelengths of lasers for relevant diverse applications and foster the knowledge to realize fiber optic sensors.	Analyse	1	1, 2, 5, 6
4	Compute the dimensions of nano particles to the physical and chemical aspects of nanomaterials.	Evaluate	2	1, 2, 3, 4,

TEXT BOOKS:

1. S.O.Pillai, "Solid State Physics", New age International publishers, 8th edition, 2018.
2. H. P. Myers, "Introduction to Solid State Physics", Taylor & Francis, 2009.

REFERENCE BOOKS:

1. V.Rajendran, "Engineering Physics", Tata Mc –GraHill Publications, 2016
2. D. Halliday, R. Resnick and J. Walker, "Fundamentals of Physics", 6th edition, John Wiley
3. and Sons, New York, 2001.
4. Charles Kittel, "Introduction to solid state physics", 7th edition, Wiley, Delhi, 2007.
5. Donald A. Neamen, "Semiconductor Physics and Devices: Basic principle", 4th edition,McGraw-Hill, New York, 2012.

22ME101 ENGINEERING GRAPHICS

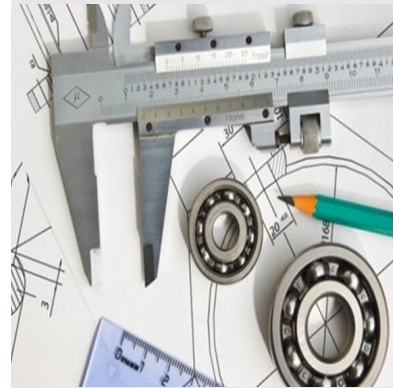Hours Per Week :

L	T	P	C
2	0	2	3

PREREQUISITE KNOWLEDGE: Basics of Geometry

COURSE DESCRIPTION AND OBJECTIVES:

Engineering graphics is the language of engineers and is the most effective way of communicating and sharing technical ideas in the form of pictures/drawings. The objective of this course is to familiarize the students with the conventional concepts of engineering drawing and computer aided drawing.

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Image file name: Engineering Graphics

MODULE-1

UNIT-1   **6L+0T+6P=12 Hours**

ENGINEERING CURVES:

Types of lines; Lettering, Dimensioning, Geometric constructions - lines, polygons (Angle, ARC, General and Inscribe in circle method), Conical curves (General method), Ellipse by Oblong method.

UNIT-2   **10L+0T+10P=20 Hours**

ORTHOGRAPHIC PROJECTIONS OF POINTS, LINES & PLANES:

Principles of projection; Projections of points; Projection of straight lines - Inclined to one plane, inclined to both planes; Projection of planes - Inclined to one plane.

PRACTICES:

- Construction of polygons using different methods (i.e. ARC, Angle, General).
- Inscribe a regular hexagon & pentagon in a circle of the given diameter.
- Tracing of conical curves (Ellipse, Parabola, Hyperbola) by using General Method.
- Draw the projections of the points situated in all the 4 quadrants.
- Draw the projections of a line when it is inclined to one plane (HP or VP).
- Draw the projections of a line when it is inclined to both the planes (HP &VP).
- Draw the projections of a plane when it is inclined to one plane (HP or VP).

MODULE-2

UNIT-1   **6L+0T+6P=12 Hours**

PROJECTIONS OF SOLIDS AND DEVELOPMENT OF SURFACES:

Projections of Solids: Projection of solids axis inclined to one reference plane - Prisms, pyramids, Cylinder and cone.

Development of Surfaces: Development of lateral surfaces of simple solids - Prisms, Pyramids, Cylinder and cone.

UNIT-2   **10L+0T+10P=20 Hours**

ORTHOGRAPHIC VIEWS AND DRAFTING USING COMPUTER PACKAGE:

Orthographic Views: Conversion of pictorial views into orthographic views.

Drafting Using Computer Package: Introduction to 2D modelling software - AutoCAD; Conversion of Isometric view into Orthographic views of simple castings; Conversion of Orthographic views into Isometric view of simple solids - Prisms, Pyramids, Cylinders and cones.

SKILLS:

✓ *Convert iso-metric views of objects into orthographic views and vice versa.*

✓ *Visualize the shape of the 3D components.*

✓ *Create pictorial views by using AutoCAD.*

✓ *Understand projections by visualization.*

PRACTICES:

- Draw the projections of Prisms, when they are inclined to one reference plane (HP or VP).
- Draw the projections of Pyramids, when they are inclined to one reference plane (HP or VP).
- Draw the projections of cylinder & cone, when they are inclined to one reference plane (HP or VP).
- Draw the complete surface development of prisms & pyramids with the given dimensions.
- Draw the complete surface development of cylinder & cone with the given dimensions.
- Draw the orthographic view's (i. e. front view, top view, and side view) of the given pictorial view of the sketches by using AutoCAD.
- Draw the Isometric view of simple solids (Prisms & Pyramids) by using AutoCAD.
- Draw the Isometric view of simple solids (Cylinder & Cone) by using AutoCAD.

COURSEOUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Communicate the technical ideas in the form of drawings.	Apply	1	1,2,3,5
2	Apply the drawing skills in representing various geometrical features.	Apply	1	1,2,3,5
3	Develop orthographic projections and isometric views of various objects.	Apply	1	1,2,3,5
4	Estimate the lateral surface area of regular geometrical solids.	Analyze	2	1,2,3,5
5	Sketch simple objects and their pictorial views using AutoCAD.	Analyze	2	1,2,3,5

TEXT BOOKS:

1. J Hole, "Engineering Drawing", 2nd edition, Tata McGraw-Hill, 2019.
2. N D Bhatt, "Engineering Drawing", 53rd edition, Charotar Publication, 2014.

REFERENCE BOOKS:

1. Basant Agrawal and C.M. Agrawal "Engineering Drawing", 2nd edition, Tata Mc Graw- Hill, 2018.
2. K L Narayana, "Engineering drawing", 3rd edition, SciTech Publications, 2011.
3. Colin H. Simmons, Dennis E. Maguire, Manual of Engineering Drawing, 2nd edition, 2003.

22TP104 BASIC CODING COMPETENCY

Hours Per Week :

L	T	P	C
0	1	3	2

PREREQUISITE KNOWLEDGE: Programming in C.

COURSE DESCRIPTION AND OBJECTIVES:

This course is aimed to impart knowledge on advanced concepts of C programming language and problem solving. At the end of this course, students will be able to design, implement, test and debug complex problems using features of C.

MODULE-1

UNIT-1   **0L+4T+12P=16 Hours**

NUMBER CRUNCHING :

PRACTICES:

Problems On Number Crunching

- Write a program to check if a given number is perfect or not.
- Write a program to check if a given number is deficient or not.
- Write a program to check if 2 given numbers are amicable or not.
- Write a program to check if 2 given numbers are betrothed or not.
- Write a program to check whether a given number is an Armstrong number or not.
- Write a program to print the series of prime numbers in the given range.
- Write a program to print all the perfect numbers in a given range.
- Write a program to generate all deficient numbers in a given range.
- Write a program to generate all the amicable numbers in a given range.
- Write a program to generate all the betrothed numbers in a given range.
- Write a program to find the largest prime factor of a given number.
- Write a program to check whether the given number is a palindrome or not.
- Write a program to calculate sum of the individual digits for the given number.
- Write a program to find the first number that has more than 'n' factors, excluding 1 and that number.
- Write a program to accept a number as input and print its factorial.
- Write a program to accept a number n, print first N Fibonacci numbers.
- Write a program to check if an input number is Armstrong number or not.
- Write a program that takes input a,b. Print a power b.
- Write a program that takes input a number n, check if it a perfect square or not.
- Print array in spiral format.
- Print sum of each row in a matrix.
- Print sum of each column in matrix.
- Print left->right and right->left diagonals in a matrix.
- Initially you are at (0,0) find the shortest path count to reach the (n, n) block in matrix.
- Remove all the elements present in row and column of unsafe elements. An element is called unsafe if it is equal to smallest or largest value. Count number of remaining elements.
- Write a program to check if the string contains all the letters of alphabet.
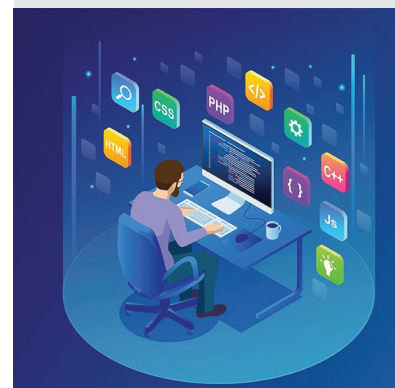
- Check if a string is matching password requirements.
- Check if String A contains String B (String searching).
- Check if a number is harshad number or not.
- Write a program to get 3 numbers as input. The first is the number num1 and second is the digit that needs to be replaced. The third is the digit that is to replace the 2nd digit. Print the number after performing this operation.
- Write a program to accept a number and swap its alternate digits. Print the number generated.
- Write a program to accept a number and choice as input. If the choice is 0 rearrange the number such that the odd digits are ordered first followed by the even digits. If the choice is 1 rearrange the number such that the even digits are ordered first followed by the odd digits. Print the rearranged number. The order of occurrence of the digits is to be preserved.
- Write a program to determine that whether the given quadrilateral is cyclic or not. You are given the sizes of angles of a simple quadrilateral (in degrees) A, B, C and D, in some order along its perimeter.

    Note: A quadrilateral is cyclic if and only if the sum of opposite angles is 180^0.

- Chef is a very lazy person. Whatever work is supposed to be finished in x units of time, he finishes it in m*x units of time. But there is always a limit to laziness, so he delays the work by at max d units of time. Given x,m,d, find the maximum time taken by Chef to complete the work.
- Suppose Chef is stuck on an island and currently he has x units of food supply and y units of water supply in total that he could collect from the island. He needs xr units of food supply and yr units of water supply per day at the minimal to have sufficient energy to build a boat from the woods and also to live for another day. Assuming it takes exactly D days to build the boat and reach the shore, tell whether Chef has the sufficient amount of supplies to be able to reach the shore by building the boat? Read five integers x,y,xr,yr,D from the user and display "YES" if Chef can reach the shore by building the boat and "NO" if not (without quotes).
- There are 3 problems in a contest namely A,B,C respectively. Alice bets Bob that problem C is the hardest while Bob says that problem B will be the hardest.

    You are given three integers SA,SB,SC which denotes the number of successful submissions of the problems A,B,C respectively. It is guaranteed that each problem has a different number of submissions. Determine who wins the bet.

    1) If Alice wins the bet (i.e. problem C is the hardest), then output Alice.

    2) If Bob wins the bet (i.e. problem B is the hardest), then output Bob.

    3) If no one wins the bet (i.e. problem A is the hardest), then output Draw.

    Note: The hardest problem is the problem with the least number of successful submissions.

    Input Format

    • The first line of input contains a single integer T denoting the number of test cases. The description of T test cases follows.

    • The first and only line of each test case contains three space-separated integers SA,SB,SC, denoting the number of successful submissions of problems A,B,C respectively.

    Output Format

    For each test case, output the winner of the bet or print Draw in case no one wins the bet.

    Sample Input 1

    3

    1 4 2

    16 8 10

    14 15 9

    Sample Output 1

    Draw

    Bob

    Alice

- In a season, each player has three statistics: runs, wickets, and catches. Given the season stats of two players A and B, denoted by R, W, and C respectively, the person who is better than the other in the most statistics is regarded as the better overall player. Tell who is better amongst A and B. It is known that in each statistic, the players have different values.

  Input

  The first line contains an integer T, the number of test cases. Then the test cases follow.

  Each test case contains two lines of input.

  The first line contains three integers R1, W1, C1, the stats for player A.

  The second line contains three integers R2, W2, C2, the stats for player B.

  Output

  For each test case, output in a single line "A" (without quotes) if player A is better than player B and "B" (without quotes) otherwise.

- Write a program to find the direction.

  Chef is currently facing the north direction. Each second he rotates exactly 90 degrees in clockwise direction. Find the direction in which Chef is facing after exactly X seconds.

  Note: There are only 4 directions: North, East, South, West (in clockwise order). Initially chef is at 0th second i.e., facing North direction.

  Input Format

  • First line will contain T, number of testcases. Then the testcases follow.

  • Each testcase contains of a single integer X.

  Output Format

  For each testcase, output the direction in which Chef is facing after exactly X seconds.

  Sample Input 1

  3

  1

  3

  6

  Sample Output 1

  East

  West

  South

- Chef is playing in a T20 cricket match. In a match, Team A plays for 20 overs. In a single over, the team gets to play 6 times, and in each of these 6 tries, they can score a maximum of 6 runs. After Team A's 20 overs are finished, Team B similarly plays for 20 overs and tries to get a higher total score than the first team. The team with the higher total score at the end wins the match.

  Chef is in Team B. Team A has already played their 20 overs, and have gotten a score of R. Chef's Team B has started playing, and have already scored C runs in the first O overs. In the remaining 20−O overs, find whether it is possible for Chef's Team B to get a score high enough to win the game. That is, can their final score be strictly larger than R?

  Input: There is a single line of input, with three integers, R, O, C.

  Output: Output in a single line, the answer, which should be "YES" if it's possible for Chef's Team B to win the match and "NO" if not.

- Make Array Zeros using pointers

  You are given an array A of length N (size should be created using Dynamic memory allocation) and can perform the following operation on the array:

  Select a subarray from array A having the same value of elements and decrease the value of all the elements in that subarray by any positive integer x.

  Find the least possible number of operations required to make all the elements of array A equal to zero.

The first line contains an integer N denoting the number of elements in the array.

The next line contains space-separated integers denoting the elements of array A.

Print the least possible number of operations required to make all the elements of array A equal to zero.

Sample Test case

Input:

5

2 2 1 3 1

Output:

4

UNIT-2   **0L+4T+12P=16 Hours**

PATTERNS:

PRACTICES:

Problems on Number Patterns

- Write a program to generate Floyd triangle. Sample input N= 4.

  1

  2 3

  4 5 6

  7 8 9 10

- Write a program to generate the following pattern. Sample input N=5.

  13579

  3579

  579

  79

  9

- Write a program to generate the following pattern. Sample input N=4.

  1111111

  222222

  33333

  4444

  333

  22

  1

- Write a program to generate the following pattern. Sample input N=5.

  5432*

  543*1

  54*21

  5*321

  *4321

- Write a program to generate the following pattern. Sample input N=5.

  12   21

  123   321

  1234 4321

  123454321

- Write a program to generate the following pattern. Sample input N=5.

  1

  2*2

  3*3*3

  4*4*4*4

  4*4*4*4

  3*3*3

  2*2

  1

- Write a program to generate the following pattern. Sample input N=4.

  1

  212

  32123

  4321234

- Write a program to generate the following pattern. Sample input N=5.

  *

  * *

  * * * *

  * *

  *

- Write a program to print Pascal triangle for the given number of rows. Sample input N=5.

```
                1
            1       1
        1       2       1
    1       3       3       1
1       4       6       4       1
```

- Write a program to generate the following pattern. Sample input N=4.

  1234

  2341

  3421

  4321

- Print Hollow Diamond pattern.
- Print pascals triangle.
- Print Floyds triangle.
- Print Butterfly Pattern.
- Print palindromic pattern.
- Print full inverted number triangle.
- Check if a number is prime or not (Efficient Approach).
- Find sum of all the digits of the number.
- Print transpose of given matrix.
- Rotate a two dimensional matrix by 90, 180, 270 degrees.

MODULE-2

UNIT-1   **0L+4T+12P=16 Hours**

ARRAYS:

PRACTICES:

Problems On Arrays

- Given an unsorted array of size N, and the array elements are in the range of 1 to N. There are no duplicates, and the array is not sorted. One of the integers is missing. Write a program to find the missing number.
- Given an array consisting of only 0s and 1s in random order rearrange the array such that all the 0s are to the left of the array and 1s to the right.
- Give an array consisting of odd and even numbers in random order, rearrange the array such that all the odd numbers are to the left of the array and even numbers are to the right of the array.
- Write a program to find all the unique elements in an array.
- Write a program to merge two arrays of the same size sorted in descending order.
- Write a program to count the frequency of each element in an array of integers.
- Write a program to find the second largest element in an array.
- Write a program to find the second smallest element in an array.
- Write a program to find that one element in array that occurs odd number of times, where every other element appears even number of times.
- Create a jagged array (adjacency list representation of a graph) with no of rows and no of columns in each row as specified by the user.
  Hint: Use Dynamic memory allocation (malloc() or calloc())

  Input:
  Enter no of rows: 3
  Enter no of columns Row in 1: 3
  Enter no of columns Row in 2: 5
  Enter no of columns Row in 3: 2
  Enter the elements row wise:
  8 6 5
  8 4 6 9 7
  9 2
  Output:
  8 6 5
  8 4 6 9 7
  9 2
- Write a program to find second largest number in the array.
- Write a program to find first repeating element in the array.
- Write a program to left rotate the array.
- Write a program to right rotate the array.
- Write a program to find the largest continuous sum.
- Write a program to print the sum of 2nd largest and 2nd smallest elements.
- Write a program to find the maximum product of two numbers multiplies in array (same index should not be used twice).
- Rearrange an array consisting of 1s and 0s such that they are alternatively arranged. Print minimum number of moves required.
- In a given array, find two numbers whose sum equal k.
- Find the difference between positive and negative elements in the array.
- Implement sorting algorithms (Insertion, selection, bubble).

UNIT-2   **0L+4T+12P=16 Hours**

STRINGS:

PRACTICES:
Problems on Strings:

- Write a program to reverse a given string word by word.
- Write a program to find the first occurrence of non-repeating character in the given string.
- Write a program to compress the string as provided in the example.
- Write a program to expand a string as provided in the example.
- Write a program to reverse those words of a string whose length is odd.
- Write a program to check if a given matrix is symmetric or not.
- Write a program to convert all the cases of letter (Lower case -> Upper Case, Upper Case-> Lower Case).
- Write a program to reverse all the words (Not the entire sentence but individual words).
- Find the longest palindrome in a given string.
- Check if two strings are anagrams or not.
- Find minimum number of changes to be done to make a string palindrome.
- Convert Excel sheet name to number (A-1, B-2, Z-26, AA-27).
- Find number of possible palindromes present in a string.
- Write a C program to read a string s, and determine the number of words in s.
  Example : s=oneTwoThree

  There are 3 words in the string: 'one', 'Two', 'Three'.

- Write a C program that reads a string S and remove all duplicates characters from the given string S.
  NOTE: 1) Order of characters in output string should be same as given in input string.

  2) String S contains only lowercase characters ['a'-'z'].

  Example: S = Vignanuniversity

  The program should generate the output as: Vignauersty

- Today Ron is reading the book. Due to some reason, he started hating the word 'are' (without quotes). So he decided to replace the substring 'are' with 'R'. Write a C program that reads a line of message 's' and replace the substring 'are' with 'R'. Example: s= Howareyou.
  The program should generate the output as: HowRyou

- Write a program to concatenate the characters of the two given strings alternatively.
- Given a string S consisting of uppercase and lowercase letters, change the case of each alphabet in this string. That is, all the uppercase letters should be converted to lowercase and all the lowercase letters should be converted to uppercase.
  Input: Vignan University

  Output: vIGNAN uNIVERSITY

- Write a program to insert a given character at the beginning and end of the given string.
- Given two Strings A and B. They are said to be friends if ASCII sum of the each individual string is divisible by 4 else they are not friends. You need to find whether given two strings are friends or not.
  Sample Test case:

  Input:

  man nam

  vignan university

  Output:

  YES

  NO

- Write a program to find the frequency of each digit in the given string.

  Input Format

  The first line contains a string, which is the given number.

  Output Format

  Print ten space-separated integers in a single line denoting the frequency of each digit, indicate that the integers are from 0 to 9.

  Sample Input 0

  a11472o5t6

  Sample Output 0

  0 2 1 0 1 1 1 1 0 0

  Explanation 0

  In the given string:

  ·   1 occurs two times.
  ·   2,4,5,6 and 7 occur one time each.
  ·   The remaining digits and don't occur at all.

- Sherlock considers a string to be valid if all characters in the given string appear the same number of times. It is also valid if he can remove just 1 character at 1 index in the string, and the remaining characters will occur the same number of times.

  Write a C program that reads a string s and determine whether it is valid or not. If valid, return YES, otherwise return NO.

  Example: S=abc
  This is a valid string because frequencies are {a:1,b:1,c:1}
  S=abcc
  This is a valid string because we can remove one c and have 1 of each character in the remaining string.
  S=abccc
  This string is not valid as we can only remove 1 occurrence of c. That leaves character frequencies of {a:1,b:1,c:2}

- Read a string containing characters A and B only. Your task is to change it into a string such that there are no matching adjacent characters. To do this, you are allowed to delete zero or more characters in the string.

  Write a C program that finds the minimum number of deletions required.

  Example: S=AABAAB

  Remove A at positions 0 and 3 to make S=ABABA in 2 deletions.

  Input Format

  The first line contains an integer (the number of queries).

  The next q lines each contain a string s to analyze.

  Sample Input:

  5

  AAAA

  BBBBB

  ABABABAB

  BABABA

  AAABBB

  Sample Output:

  3
  4
  0
  0
  4

- Write a C program that reads a string 's' and it is said to be complete if it contains all the characters from a to z.
  Input Format
  First line of the input contains the number of strings N. It is followed by N lines each contains a single string.
  Output Format
  For each test case print "YES" if the string is complete, else print "NO"
  Constraints 1 <= N <= 10
  The length of the string is at max 100 & the string contains only the characters a to z.
- Write a C program that reads two strings and determine whether they share a common substring or not. A substring may be as small as one character.
  Example;
  S1=and
  S2=art
  The common substring in these two strings: a.
  Sample Input
  2
  hello
  world
  hi
  world
  Sample Output
  YES
  NO

COURSE OUTCOMES:

Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mod-ule No.	Mapping with POs
1	Write simple, but complete, C programs.	Apply	1,2	1
2	Identify suitable data type for operands and design of expressions having right precedence.	Apply	1,2	1
3	Apply decision making and iterative features of C Programming language effectively.	Apply	1,2	1
4	Select problem specific data structures and suitable accessing methods.	Analyze	1,2	1,2
5	Design and develop non- recursive and recursive functions and their usage to build large modular programs and also able to design string manipulation functions.	Create	1,2	3
6	Develop C programs that are understandable, debuggable, maintainable and more likely to work correctly in the first attempt.	Create	1,2	3,4

TEXT BOOKS:
1. Behrouz A. Forouzan, Richard F.Gilberg, "Programming for Problem Solving", 1st edition, Cengage publications, 2019.
2. Ajay Mittal, "Programming in C - A Practical Approach", 1st edition, Pearson Education, India, 2010.

REFERENCE BOOKS:
1. Reema Thareja, "Computer Fundamentals and Programming in C", 1st edition, Oxford University Press, India, 2013.
2. Herbert Schildt, "C: The Complete Reference", 4th edition, Tata McGraw-Hill, 2017.
3. Byron S Gottfried, "Programming with C", 4th edition, Tata McGraw-Hill, 2018.

22TT101 TEXTILE FIBERS

Hours Per Week :

L	T	P	C
3	0	2	4

PREREQUISITE KNOWLEDGE: Basics of textileprocesses.

COURSE DESCRIPTION AND OBJECTIVES:

The main objective of this course is to impart the knowledge of different types of natural and manmade fibers and its principles of formation. It also enables the students to know the morphological and chemical structure of natural fibers and different fibers structures and its effects on fiber properties. It also includes the production process of various manmade fibers and its properties and applications.

MODULE–1

UNIT-1   **10L+0T+0P=10 Hours**

NATURAL FIBERSS:

Fundamental terms of textile fibers - staple fibers, regenerated fibers; filament, yarn, fabric types, weave Characteristics of fibers forming polymer; Requirement of fibers formation, Properties of textile fibers, Degree of polymerization, crystallinity, orientation; Classification of fibers; Advantages and disadvantages of natural & manmade fiberss; sequence of the textile industry.

Vegetable Fibers

Cotton fibers, cultivation and harvesting, structure, properties and applications; Bast Fibers -Retting and extraction process, properties and applications of Jute fibers;

UNIT-2   **14L+0T+16P=30 Hours**

ANIMALFIBERSS:

Animal Fibers – Wool, types and grading, structure, properties and applications Silk - Types, life cycle and production, structure, properties and applications; Application of other sustainable natural fibers in Technical Textiles.

PRACTICES:

- Identification of Textile fibers by different methods
- Microscopic test of fibers.
- Analysis the textile fibers by Feel test
- Identification of specific natural fiber out of different natural fibers.
- Determination of specific cellulosic fiber out of different cellulosic fibers.
- Determination of specific protein fiber out of different protein e fibers.
- Identification of unknown fibers using chemical test.
- Burning test of fibers.

MODULE–2

UNIT-1   **10L+0T +0P=10 Hours**

MANMADE FIBERS:

Manmade Fibers Formation Technologies - Types, comparison between different manmade fibers formation technology, Drawing / Orientation and its effects or properties. Regenerated Fibers: Viscose Rayon, Modal & Micro Modal - Cellulose Ester fibers manufacturing process, properties and applications; Introduction to other regenerated fibers.

Polyamide fibers (Nylon 6 & Nylon 66), : Polyester, HDPE, Polyolefin Fibers (Polypropylene), Polyacrylonitrile – Polyurethane manufacturing process, properties and applications in Technical textiles,

UNIT-2   **14L+0T+16P=30 Hours**

HIGH-PERFORMANCE FIBERS:

Application of high-performance fibers; Carbon Fibers, Aramid Nomex, Kevlar ,Fiberss, Metal Fibers; Glass Fibers.

PRACTICES:

- Identification of blended textile fibers and blend proportions by different methods
- Identification of specific manmade fiber out of different manmade fibers.
- Determination of fibers in P/C blended yarn using phenol method.
- Determination of fibers in P/C blended yarn using sulphuric acid.
- Determination of fibers in P/V blended yarn using phenol method.
- Determination of fibers in P/V blended yarn using sulphuric acid.
- Identification fiber from standard FTIR spectra of textile fibers.
- Chemical test of fibers.
- Model sequential operations in the manmade fibers spinning
- Arrange mill visit to manmade fibers production unit.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Predict operations involved in cultivation and harvesting of natural fibers.	Apply	1	1, 2, 12
2	Integrate all textile machineries for man-madefibersproduction.	Apply	1	1, 2, 5, 12
3	Find proper methods for fibers production and identification.	Analyse	2	1, 2, 3, 5, 12
4	Categorize various equipment used in find fibers.	Analyse	2	1, 2, 12

TEXT BOOKS:

1. Kothari V. K., "Textile Fibers: Development and Innovations", Vol. 2, Progress in Textiles, IAFL Publications, New Delhi, 2000
2. Vaidya A. A., "Production of Synthetic Fibers", Prentice Hall of India Pvt. Ltd., New Delhi, 1988.

REFERENCE BOOKS:

1. Gupta V. B. and Kothari V. K. (Editors), "Manufactured Fibers Technology", Kluwer Academic Publishers, 1997.
2. Cook J. G., "Handbook of Textile Fiberss: Vol. 2: Man Made Fiberss", The Textile Inst., 5th Ed. 1984.
3. Srinivasa Murthy H. V., "Introduction to Textile Fiberss", Textile Association, India, 1987.
4. Nakasjima (English edition, edited by Kajiwara K. and McIntyre J. E.), "Advanced Fibers Spinning Technology", Wood head Publication Ltd., England, 1994.

22EN104 TECHNICAL ENGLISH COMMUNICATION

Hours Per Week :

L	T	P	C
2	0	2	3

Image source: https://www.abebooks.com/9781316640081/English-Technical-Communication-Students-Book-1316640086/plp

PREREQUISITE KNOWLEDGE: Basic sentence formation, understanding contextual meanings, basic writing skills and moderate fluency in English.

COURSE DESCRIPTION AND OBJECTIVES:

In this course students will read, analyze, and interpret material from technical and general fields, and practice reading, writing, listening and speaking skills to gain exposure and functional English on a variety of contemporary topics. The overall course objective is to provide English for Specific Purposes(ESP) instruction to enhance students' reading, writing, listening and speaking skills through a practice in the language. It will aim to build students' confidence and motivation through exposure to academic skills like Note making/taking, Paraphrasing, Summarizing, Report Writing, Making Presentations etc., so as to generate interest in the language from an ESP perspective. Finally, students are expected through the course to gain key strategies and expression for communicating with professionals and non-specialists.

MODULE-1

UNIT-1   **8L+0T+8P=16 Hours**

GENETICS:

Reading: Reading for Note Making Sub skills: Reading for global understanding (skimming), specific information (scanning), understanding main ideas and supporting ideas, guessing contextual meanings from the text. -Vocabulary building: commonly used roots, prefixes, and suffixes.

Writing: Note making, organising main points and sub points, numbering and sequencing, suggesting titles, paraphrasing and summarising.

Functional grammar: Common Errors in Articles and Prepositions (Handout).

Listening: Listening for Note Taking: top down and bottom up approach, listening for main ideas and supporting points.

Speaking: Presentation in teams - ideas on the topic summarised, making a PPT, effective introductions and conclusions, logical organisation of content, using appropriate structure and cohesive devices.

UNIT-2   **8L+0T+8P=16 Hours**

ALIENS:

Reading: Predicting, skimming, scanning, reading for inference, extrapolative reading

Vocabulary building: Academic vocabulary from the text: synonyms, antonyms, Words often confused.

Writing: Paragraph writing; writing a topic sentence, supporting sentences, effective introductions and conclusions, use of cohesive devices. Types of Paragraphs: Descriptive, narrative, argumentative and expository.

Functional grammar: Common Errors in Verb forms and Conditional sentences (Handout).

Listening: Listening for identifying parts from a description, listening to and sorting information, listening for specific information.

Speaking: Narrating/Retelling an incident, using suitable cohesive devices/discourse markers Speaking of past and present habits/ activities/events - Speaking of future plans.

PRACTICES:

- Note making.
- Summarizing.
- Paragraph Writing.
- Error correction and Restructuring.
- Vocabulary building.
- Listening comprehension.
- Note taking.

MODULE-2

UNIT - 1   **8L+0T+8P=16 Hours**

SOCIAL MEDIA – HEALTH AND NUTRITION:

Reading : Reading for factual information researching for supporting evidence - skimming, scanning, Vocabulary building: One-word substitutes.

Writing: Letter Writing- E-mail writing – New age communication – Format, protocol, and style- WhatsApp, Facebook and Twitter Functional grammar: Common Errors in Sub-Verb Agreement and Modals.

Listening: Listening to a Business Presentation: Listening for deducing information, for abstract details and specific details, listening for taking a message.

Speaking: Making a presentation with a PPT on a topic assigned- organising the presentation using appropriate discourse markers - presenting a point of view - Extempore.

UNIT-2   **8L+0T+8P=16 Hours**

FASHION:

Reading: Reading for data interpretation and information transfer from graphical aids to text reports (pictograms. tables, graphs, pie charts, flow charts), deducing specific information and general information

Vocabulary building: Business vocabulary, collocations, idioms and phrasal verbs.

Writing: Writing a Report: Drafting general and factual reports - writing an overview - an effective introduction - organising information into paragraphs (Stages of writing: planning /organising /writing / editing /rewriting)

Functional grammar: Transformations and miscellaneous common errors.

Listening: Listening to a Ted talk and sorting information – taking notes from a discussion.

Speaking: Group Discussion – prerequisites -generating content - initiating a discussion - expressing one's opinion ~ leading a discussion - agreeing/ disagreeing to someone's view - cutting into a speech - body language and voice modulation.

PRACTICES:

- E-mail writing.
- Letter writing.
- Report writing.
- Messaging in Social media.
- Extempore.
- Making PPTs.

SKILLS:

- ✓ *Apply different sub skills like skimming, scanning, reading for information, reading for inference etc. to understand different kinds of text.*

- ✓ *Apply different sub skills like top down, bottom up approaches to listening.*

- ✓ *Use functional vocabulary relevant to engineering and technology to express ideas lucidly.*

- ✓ *Use appropriate sentence structure, cohesive devices to construct simple text in regular correspondence like e-mails and letters.*

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Apply a variety of strategies to interpret and comprehend spoken texts/ discourse using contextual clues.	Apply	1	6, 7, 8, 9, 10, 12
2	Apply appropriatereading strategies to interpret content / material related to engineering and technology domain.	Apply	1	6, 7, 8, 9, 10, 12
3	Possess an ability to write clearly on topics related to technology and workplace communication.	Analyze	2	6, 7, 8, 9, 10, 12
4	Choose functional language, grammar structures, cohesive devices and skills of organisation to express clearly in speaking.	Evaluate	2	6, 7, 8, 9, 10, 12
5	Participate in discussions and make short presentations on general and technical topics.	Create	2	6, 7, 8, 9, 10, 12

LANGUAGE LAB ACTIVITIES:

Session - 1: Dictionary Skills

Session - 2: Introduction to Phonetics and Identifying Phonemes

Session - 3: Pronunciation Practice (Commonly mispronounced words)

Session - 4: Rosetta Stone (Exercises on LSRW)

Session - 5: Listening Comprehension (Summarising exercise on a Ted Talk)

Session - 6: Technical Presentations (Individual)

Session - 7: Technical Presentations (Team)

Session - 8: TOEFL Mastery

TEXT BOOK:

1. N P Sudharshana & C Savitha, "English For Technical Communication", Cambridge University Press, 2016.

REFERENCE BOOKS:

1. Balasubramanian T,"A Text book of Phonetics for Indian Students", Orient Longman, New Delhi, 1989.
2. Krishnaswamy, N and Sriraman, T, "Current English for Colleges", Trinity publications, 2016.
3. Mohan Krishna and Meera Banerjee, "Developing Communication Skills", Macmillan India Ltd. New Delhi, 1990.
4. Ashraf Rizvi M, "Effective Technical Communication", 2nd Edition, McGraw Hill Education, 2017.
5. Narayana Swamy V R, "Strengthen your Writing", Third Edition Orient Black Swan, New Delhi, 2005.

II YEAR

TEXTILE TECHNOLOGY

B.Tech.

COURSE CONTENTS
I SEM & II SEM

22ST202 PROBABILITY AND STATISTICS

Hours Per Week :

L	T	P	C
3	2	0	4

PREREQUISITE KNOWLEDGE: Basic knowledge in statistics and mathematics .

COURSE DESCRIPTION AND OBJECTIVES:

To provide students with foundation in elementary topics of statistics and probability such as descriptive statistics, correlation, probability, random variables, correlation, regression, and testing of hypothesis. The course emphasizes statistics to solve engineering and management problems.

MODULE-1

UNIT-1   **12L+0T+8P=20 Hours**

DESCRIPTIVE STATISTICS:

Basic Definitions, Frequencies, Graphical Representation, Histogram, Ogive curves; Measures of Central tendency, Arithmetic mean, Median, Mode, Mean deviation, Standard deviation; Symmetry and Skewness, Karl Pearson's Coefficient of skewness.

UNIT-2   **12L+0T+8P=20 Hours**

PROBABILITY AND RANDOM VARIABLES:

Probability: Introduction, Definition (Classical and Axiomatic approach), Addition theorem, Conditional probability, Multiplication theorem and Bayes theorem.

Random Variables: Random variables, Discrete and Continuous variables and distribution function. Expectation, Variance of random Variables, Tchebysher's inequality.

PRACTICES:

- Various graphical presentation techniques.
- Measures of central tendency.
- Skewness.
- Karl Pearson's coefficient of skewness.
- Definitions of probability.
- Applications of addition theorem.
- Applications of multiplication theorem.

MODULE - 2

UNIT-1   **12L+0T+8P=20 Hours**

REGRESSION ANALYSIS AND DISTRIBUTIIONS:

Correlation and regression: Correlation, Types, Pearson's and Spearman's Coefficient of correlation, Regression, Regression lines.

Distributions: Introduction to Distributions: Binomial, Poisson and Normal distributions with properties and applications.

Source: https://images.app.goo.gl/QBM6C8TQNTbNWXuA8

UNIT-2   **12L+0T+8P=20 Hours**

TESTING OF HYPOTHESIS:

Testing large samples- single mean, two means, one proportion and two proportions. Testing small samples –single mean, two means (independent and paired samples), Chi square test-goodness of fit and independence of attributes.

PRACTICES:

- Correlation.
- Karl Pearson's coefficient of correlation.
- Regression and regression lines.
- Applications of statistical distributions.
- Testing the large sample tests-one mean and two sample means.
- One proportion and two proportion tests.
- Testing small samples-one, two samples and paired tests.
- Chi-square test for goodness of fit.
- Chi-square test for independence of attributes.

COURSE OUTCOMES:

Upon Successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Apply measures of central tendency, skewness, and Karl Pearson's coefficient of skewness to study the statistical data sets.	Apply	1	1,2
2	Apply the probability theory and their applications to measure the uncertainty.	Apply	1	1,2
3	Study the relations between statistical variables and can fit the mathematical models for association.	Analyze	2	1,2,3
4	Test the statistical significances for various samples.	Evaluate	2	1,2,4
5	Identify the distribution type to measure the occurrences of chance.	Evaluate	2	1,4,5

TEXT BOOKS:

1. Sheldon M. Ross, An Introduction to Probability and Statistics for Engineers and Scientists, 3rd Edition, Academic Press, Elsevier.
2. S. C. Gupta and V. K. Kapoor, "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, 2012.

REFERENCE BOOKS:

1. P. R. Vittal, "Mathematical Statistics", Margham Publications, Chennai, 2018.
2. Kishore S. Trivedi, "Probability and Statistics with Realiability, Queueing and Computer Science Applications", 2ndedition, Wiley Student edition, 2008.
3. A. Singaravelu, "Probability and Statistics", 22ndedition, Meenakshi Agency, 2015.

22TP201 DATA STRUCTURES

Hours Per Week :

L	T	P	C
2	2	2	4

PREREQUISITE KNOWLEDGE: Programming in C

COURSE DESCRIPTION & OBJECTIVES:

This course is aimed at offering fundamentals concepts of data structures and explains how to implement them. It begins with the basic concepts of data, data structures and then introduces the primitive and non-primitive data structures in detail. It forms the basis for understanding various ways of representing data and its usage in different computing applications.

MODULE-1

UNIT-1   **8L+8T+8P=24 Hours**

DATA STRUCTURES BASICS:

Basic terminology – data, information, datatype; Data Structures – Introduction, storage structures-sequential and linked storage representations; classification of data structures; Applications of data structures.

Searching: Linear Search and Binary Search.

Sorting: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort and Merge Sort.

UNIT-2   **8L+8T+8P=24 Hours**

STACKS, QUEUES AND LINKED LISTS:

Linked Lists: Introduction, Types of linked list – Singly linked list, doubly linked list and circular linked list, representation of linked list, Operations of linked list. Traverse forward/ reverse order, searching, insertion into, deletion for linked lists; Multi lists; Applications of linked lists.

Stacks – Introduction, array and linked representations, implementation and their applications; Queues – Introduction, array and linked representations, implementation and their applications; Types – Linear, circular and doubly ended queues – operations; Applications of Queues.

PRACTICES:

Problems on Recursion – Level 1

- Find the product of 2 numbers using recursion.
- Find the sum of natural numbers using recursion.
- Find the factorial of a number using recursion.
- Find the Nth term of Fibonacci series using recursion.
- Calculate the power using recursion.
- Write a recursive program for checking if a given number is a prime number.
- Given two integers write a function to sum the numbers without using any arithmetic operators.
- Convert a decimal to binary using recursion.
- Print all factors using recursion.
- Find the maximum product of digits among numbers less than or equal to N.
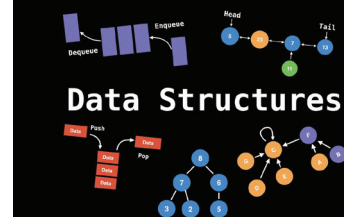
Problems Recursion – Level 2

- Implement insertion sort recursively
- Write a program to find the numbers less than N that are product of exactly 2 distinct prime numbers - using recursion
- Implement selection sort recursively
- Find the middle of a singly linked list using recursion
- Find the sum of even numbers of an array using recursion
- Check if a given array is in sorted order using recursion
- Print alternate nodes of a linked list using recursion
- Reverse a doubly linked list using recursion
- Write a recursive function that returns all permutations of a given list
- Implement bubble sort recursively

Problems on Sorting and Searching – Level 1

- Implement linear search function
- Implement binary search function
- Implement iterative search function
- Implement the insertion sort function
- Implement the bubble sort function
- Implement the quick sort function
- Implement the merge sort function
- Implement the quick sort function
- Implement the heap sort function
- Implement the radix sort function

Practice Problems on Stacks – Level 1

- Implement two stacks using a single array
- Given an array replace every element with nearest greater element on the right
- Given a stack reverse the elements using only push and pop functions
- Postfix evaluation using stack
- Maximum sum in sliding window
- Balance symbols
- Find middle element in a stack
- Remove middle element from a stack
- Implement push and pop using linked list
- Given an array of characters with the middle marked by X, check if the string is a palindrome

Practice Problems on Queues – Level 1

- Write a program to accept two numbers as input check if they are equal
- Write a program to accept two characters as input and check if they are equal
- Write a program to accept two numbers as input and print the greater of the 2 numbers
- Write a program to accept two numbers as input and print the lesser of the 2 numbers
- Write a program to accept 3 numbers as input and print the maximum of the 3
- Write a program to accept 3 numbers as input and print the minimum of the 3
- Write a program to accept a number as input and print EVEN if it is an even number and ODD if it is an odd number
- Write a program to accept a number as input and check if it is divisible by 3. If it is divisible by 3 print YES else print NO
- Write a program to accept a number as input and check if it is divisible by both 3 & 5. If it is divisible print YES else print NO
- Write a program to accept a number as input and check if it is positive, negative or zero.

Practice Problems on SLL – Level 1

- Implement the insert function to insert nodes into a singly linked list (ascending order)
- Implement the insert function to insert nodes into a singly linked list (descending order)
- Implement the search node function
- Implement the delete node function
- Display forwards function
- Display backwards function
- Count the number of nodes in a singly linked list
- Swap alternate nodes of a singly linked list
- Move last node to the front of the linked list
- Move first node to the last of the linked list

Problems on DLL – Level 1

- Implement insert function
- Implement display forward function
- Implement display backward function
- Implement search function
- Implement delete function
- Reverse a doubly linked list from M to N
- Find the sum of the odd and even nodes
- Count odd keys of the linked list
- Merge two sorted lists
- Delete adjacent duplicate nodes

Problems on CLL – Level 1

- Insert function (circular doubly linked list)
- Search function
- Display forward
- Display backward
- Delete node (circular doubly linked list)
- Print the middle N nodes of a circular singly linked list
- Move the last node of a circular singly linked list to the beginning
- Delete adjacent duplicate nodes of a circular singly linked list
- Delete nodes greater than a value from a circular doubly linked list
- Find the sum of the nodes of a circular linked list

Problems on Linked List – Level 2

- Given 2 sorted linked lists, print the common elements
- Reverse a list (using Stack)
- Given a pointer to a node (not the last node), delete the node
- Reverse a list (Recursive)
- Reverse a list (Iterative)
- Reverse a singly linked list in pairs (recursive)
- Reverse a singly linked list in pairs (iterative)
- Check if a singly linked list is a palindrome or not
- Remove the loop if exists
- Given 2 linked lists with data in the ascending order, merge them into a single list

MODULE-2

UNIT-1   **8L+8T+8P=24 Hours**

TREES:

Introduction, Properties, Binary Tree – Introduction, properties, array and linked representations; Tree traversals and their implementation; Expression trees; BST – definition and operations, AVL trees – definition and construction; Applications of binary trees.

Hashing: Introduction, Different hash functions, collision-collision avoidance, handling methods

UNIT-2   **8L+8T+8P=24 Hours**

GRAPHS:

Introduction, Properties, Graphs representations – adjacency matric, adjacency list, set representation; Traversals - breath first search and depth first search; Applications of graphs

PRACTICES:

Practice Problems on BST – Level 1

- Insert function
- Insert function (recursive)
- Search function
- Pre order traversal
- Post order traversal
- In order traversal
- Level order traversal
- Delete child node
- Delete parent node
- Delete nodes greater than a value from a circular doubly linked list

Practice Problems on Priority Queues – Level 1

- Meeting rooms problem
- Ugly number
- Find median from data stream
- Find the top K frequent elements
- Find K Pairs with smallest sums
- Find the Kth smallest element in a sorted matrix
- Trapping Rain Water
- Rearrange String k distance apart
- Sort characters by frequency
- Solve the maze problem

Practice Problems on Graphs – Level 1

- Implement Graph data structure
- Implement BFS - iterative solution
- Implement BFS - recursive solution
- Implement DFS - iterative solution
- Implement DFS - recursive solution
- Check if given graph is strongly connected or not
- Check if given graph is strongly connected or not - using DFS
- Given a graph find the arrival and departure time of its vertices in DFS. Arrival time is the time when the vertex was explored for the first time, and departure time is the time at which all the neighbours are explored and are ready to backtrack
- Given a directed acyclic graph and a source vertex, find the cost of the shortest path from source vertex to all other vertices present in the graph. If a vertex cannot be reached from given source vertex that distance may be printed as infinite
- Given an undirected graph, check if the graph is 2 edge connected or not

Practice Problems on Hashing – Level 1
- Print a binary tree in vertical order
- Find whether an array is subset of another array
- Given an array A [] and a number x, check for pair in A [] with sum as x
- Minimum operation to make all elements equal in array
- Maximum distance between two occurrences of same element in array
- Check if a given array contains duplicate elements within k distance from each other
- Find duplicates in a given array when elements are not limited to a range
- Most frequent element in an array
- Smallest subarray with all occurrences of a most frequent element
- First element occurring k times in an array

Problems on Graphs – Level 2
- Find the shortest graph distances between every pair vertices in a given path. Assume that the graph does not have any negative edges.
- Find the shortest graph distances between every pair of vertices in a given path. The graph can have negative edges.
- Detect cycle in DFS.
- Count the number of connected components of a graph represented in the adjacent matrix.
- Count the number of connected components of a graph represented in the adjacent matrix - using DFS.
- Find a spanning tree - not necessarily a minimum spanning tree.
- Detect cycle in an undirected graph.
- Given an undirected graph, find its depth.
- Determine if a directed graph has a unique topological ordering.
- Given a directed acyclic graph and two vertices v and w, find the lowest common ancestor.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Explore the organization of several ADTs and the manipulation (searching, insertion, deletion, traversing) of data stored in various data structures.	Apply	1	1
2	Apply different data structures to solve a given problem.	Apply	1	1
3	Analyse the efficiency of using different data structures and choose the efficient data structure for solving a given problem.	Analyse	2	2
4	Develop new algorithms to solve various problems.	Create	3,4	3,4

TEXT BOOKS:

1. D Samantha, "Classic Data Structures", 2nd Edition, Eastern Economic Prentice hall private limited press, 2000.

REFERENCE BOOKS:

1. Ellis Horowitz and Sartaj Sahni, "Fundamentals of Data Structures", illustrated edition, Computer Science Press, 2006.
2. Mark Allen Weiss, "Algorithms, Data Structures and Problem Solving with C++ illustrated", 2nd edition, Addison-Wesley publishing company, 2002.
3. R G Dromey and Pearson, "How to solve it by Computer", 2nd edition, Impression edition, 1998.

22TT201 YARN MANUFACTURING

Source: https://www.
anilassociates.com/wp-content/
uploads/2021/01/cotton-yarn-1.
jpg

Hours Per Week :			
L	T	P	C
2	2	0	3

PREREQUISITE KNOWLEDGE: Basics of fibers and filament.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers basics of preparatory and spinning process. The objective of this course is to impart knowledge on various techniques and methods of preparatory process and production of yarn in spinning machine.

MODULE-1

UNIT-1   **10L+0T+0P=10 Hours**

GINNING AND BLOWROOM MACHINERY:

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

UNIT-2   **10L+12T+0P=22 Hours**

CARDING MACHINE AND COMBER:

Carding Machine: Objects and principle of carding; detailed study of flat card; auto levelling; card clothing and its maintenance;

Comber: Objectives of comber preparatory; detailed study of sliver lap, ribbon lap and super lap formers; objects and principles of combing; sequence of combing operation;

PRACTICES:

- Determination of cleaning efficiency of blow room machineries.
- Determination of production of blow room machineries.
- Studies of drives and in carding machine.
- production calculation in carding machine.
- Method of Card clothing procedure.
- Combing efficiency and production calculation.

MODULE-2

UNIT-1   **10L+0T+0P=10 Hours**

DRAWING MACHINE AND ROVING MACHINE:

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

UNIT-2   **10L+12T +0P=22 Hours**

RING SPINNING:

Principle of yarn formation in ring spinning machines; working of ring spinning machine; cop building; design features of important elements used in ring spinning machine;

PRACTICES:

- Determination of draft in drawing, roving and ring spinning machines.
- Determination of twist in roving and ring spinning machines.
- Production calculations in drawing, roving and ring spinning machines.
- Studies on end breakage rate – causes and remedies.
- Draw sequential operations in the preparatory spinning mill.
- Execute model for spinning mill.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Know the process sequences involved in yarn production.	Apply	1	1, 2, 12
2	choosing machines of spinning preparatory.	Apply	1	1, 2, 5, 12
3	Calculate the production and efficiency of spinning machineries.	Analyse	1,2	1, 2, 3, 5, 12
4	outline the spinning machine operations.	Analyse	2	1, 2, 12
5	Assessing the performance of spinning mill.	Evaluate	1,2	1, 2, 12

TEXT BOOKS:

1. W. Klein, "Series of Short Staple Spinning", Wood head publishers, 2005.
2. T. K. Pattabhiraman, "Essential Facts of Practical Cotton Spinning", Mahajan Publisher, Ahmedabad, 2005.

REFERENCE BOOKS:

1. Venkatsubramani, "Spun Yam Technology, Vol-III", SSM Institute Publications Komarapalyam, 2003.
2. T.V.Ananthan, "Tablets on Combing, Speed Frame, Ring Frame", TAI Publications, 2003.
3. A. R. Khare. "Elements of Combing", Mahajan Book Publishers, Ahmedabad, 2003.

SKILLS:

✓ *Capable to produce lap from blow room.*

✓ *Able handle spinning preparatory machines.*

✓ *Setup a spinning preparatory process for given quality of yarn.*

✓ *Identify proper spinning operation to produce combed and carded yarn.*
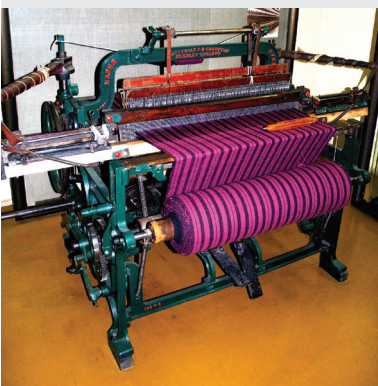
22TT202 FABRIC MANUFACTURING

			Hours Per Week :

L	T	P	C
3	0	2	4

PREREQUISITE KNOWLEDGE: Basics of fiber and yarn particulars.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers basics of preparatory and weaving process. The objective of this course is to impart knowledge on various techniques and methods of preparatory process and production of fabric using power loom.

MODULE-1

UNIT-1   10L+0T+0P=10 Hours

WINDING:

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

UNIT-2   14L+0T+16P=30 Hours

WARPING AND SIZING:

Objectives of warping, material flow in beam warping and creels used in warping machines; sectional warping machines. Sizing objectives of sizing; sizing materials and recipe used for different types of fibers; sizing machines; sizing filament yarns; concept of single end sizing, combined dyeing and sizing.

PRACTICES:

- Analysis of Yarn faults
- Faults in wound packages, their causes and remedies
- Studies on quality of knots and splices.
- Wind machine calculations
- Warping defects and calculations
- Sizing defects and production calculations

MODULE-2

UNIT-1   10L+0T+0P=10 Hours

INTRODUCTION TO WEAVING:

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

Shedding Motions: Shed geometry and shedding requirement. Types of shed. Shedding mechanisms - positive and negative. Principles of tappet, dobby and jacquard shedding mechanisms, reversing mechanisms

UNIT-2   14L+0T+16P=30 Hours

WEFT INSERTION AND BEAT UP:

Picking Mechanism: Shuttle picking and checking mechanisms, shuttle flight and timing;, Beat up mechanism: Kinematics of sley, sley eccentricity.

Secondary and Auxiliary Motions - Take up and let - off motions used in plain power looms; warp protector and warp and weft stop motion; plain power loom accessories. Automatic weft replenishment in shuttle looms – Weft feeler – types; design of shuttle, three try motions; multi shuttle looms- box changing principle, Automatic pirn changing in multi shuttle loom. Weft arrival control in looms; Temples.

PRACTICES:

- Study of jacquard shedding mechanism.
- Study of picking mechanisms in looms.
- Preparation of pattern card for dobby shedding mechanism.
- Study of let-off mechanisms.
- Study of weft replenishment mechanism in shuttle looms.
- Method of achieving the required colour patterns in 4 X 1 drop box motion.
- Study of warp protector mechanism.
- Industrial visit to weaving mills.
- Execute model for weaving shed.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Guess operations involved in weaving industries.	Apply	1	1, 2, 12
2	Assimilate all weaving machineries for production.	Apply	1	1, 2, 5, 12
3	Innovate new concepts for fabric production.	Analyse	2	1, 2, 3, 5, 12
4	Categorize various Secondary and auxiliary motions involved in weaving.	Analyse	2	1, 2, 12

TEXT BOOKS:

1. A.T.C Marks, Robinson, "Principles of Weaving", The Textile Institute, 2011.
2. S.C Adanur, "Handbook of Weaving", CRC publications, 2008.

REFERENCE BOOKS:

1. M. K. Talukdar, D. B. Ajgonkar, "Weaving Machines, Materials & Methods", Textile Institute, 1998.
2. A.Ormerod, "Modern Preparation & Weaving Machines", BWE Publications, 1983.
3. K. T. Aswani, "Plain Weaving Motions", M/S Mahajan book publishers, Ahmedabad, Gujarat, 2007.

SKILLS:

✓ *Capable to wind spinning bobbin to cone.*

✓ *Able to prepare size paste preparation for given yarn.*

✓ *Setup a weaving preparatory process for given quality.*

✓ *Identify the yarn faults, causes and remedies of particular fault.*

22TT203 TESTING OF FIBERS AND YARN

Hours Per Week :

L	T	P	C
3	0	2	**4**

PREREQUISITE KNOWLEDGE: Basics of fiber and yarn particulars.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers concepts relating to testing of fiber and yarn, mainly focused on cotton. The objective of this course is to impart knowledge on various techniques and methods of preparing samples and the quality particulars of fiber and yarn.

MODULE–1

UNIT-1   10L+0T+0P=10 Hours

QUALITY CONTROL AND TESTING OF FIBERS:

Introduction to textile testing and quality control: Objectives of testing, Sample types, selection of Samples for different tests and no. of tests. Fiber parameters effecting yarn properties and common tests to be carried out on cotton and other fibers. Fiber Quality index and spin ability of cotton

UNIT-2   14L+0T+16P=30 Hours

COTTON FIBER TESTING:

Tests related to humidity and fiber moisture, cotton staple length, 2.5% span length, strength and elongation, fineness and maturity, Neps, Color. Advanced fiber testing instruments.

Other tests: Honeydew, Blend Analysis, organic cotton.

PRACTICES:

- Determination of moisture regain of different fibers.
- Determination of Fibre maturity by NaOH swelling method.
- Determination of Fibre length by bear sorter and interpretations of results.
- Determination of Fibre fineness by ATIRA fineness tester.
- Studies on tensile properties of fibre measuring CRL, CRE and CRT principles
- Studies on AFIS and HVI instruments.

MODULE-2

UNIT-1   10L+0T+0P=10 Hours

TESTING OF YARN – COUNT, TWIST, STRENGTH:

Yarn dimensions and strength: Yarn numbering system; Measurement of linear density; Twist and measurement of twist, measurement of yarn strength by single yarn test and lea test, CSP and RKM, effect of yarn evenness, friction and hairiness.

UNIT-2   14L+0T16P=30 Hours

TESTING OF YARN – EVENNESS, HAIRINESS:

Measurement of hairiness by shirley yarn hairiness tester, zwiegle and Uster tester, hairiness meter; Evenness testing of silvers, roving and yarns; Analysis of periodic variations in mass per unit length, Index of irregularity, limit irregularity, addition of irregularities, random occurring faults (uster classimat), spectrogram, variance length curves analysis, causes and effects of irregularity.

PRACTICES:

- Determination of Yarn count by wrap reel.
- Determination of Single and plied yarn twists.
- Determination of single yarn strength.
- Determination of lea CSP and CCSP of single yarn.
- Determination of yarn diameter by microscopic method.
- Determination of lint index of cotton fibers.
- Determination of fiber orientation by Lindsley technique.
- Determination of fiber properties using AFIS (Industry visit is needed).

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Identify the procedure for select the sample for testing.	Apply	1	1, 2, 12
2	Explore various dimensions of fiber parameters.	Apply	1	1, 2, 5, 12
3	Measuring the effect of fiber maturity on yarn strength.	Apply	1,2	1, 2, 3, 5, 12
4	Evaluate the various yarn properties by proper instrument.	Analyse	2	1, 2, 12
5	Compare and correlate the various fiber parameters influencing yarn properties.	Analyse	1,2	1, 2, 12

TEXT BOOKS:

1. B. P. Saville, 'Physical Testing of Textiles', 1st Edition, Woodhead Publishing, Limited, 2000.
2. J. E. Booth, "Principle of Textile Testing", 3rd edition, CBS Publisher, 1996.

REFERENCE BOOKS:

1. K. Amutha,"A Practical Guide to Textile Testing" CRC Press, 2016.
2. ArindamBasu, "Textile Testing", Sitra Publishers, Coimbatore, 2004.
3. Elliot. B. Grower and D. S. Hamby, "Hand Book of Textile Testing", Textile Institute,1996.
4. Patricia Dolez, Olivier Vermeersch, Valério Izquierdo, "Advanced Characterization and Testing of Textiles" Elsevier, 2018.
5. Sheraz Ahmad, Abher Rasheed, Ali Afzal, "Advanced Textile Testing Techniques", CRC Press 2017.

SKILLS:

✓ *Measure fiber length, strength, fineness and maturity.*

✓ *Measure yarn count strength, twist.*

✓ *Analyse and correlate the testing report of AFIS, HVI, spectrograph and USTER tester.*

22TT204 TECHNOLOGY OF PREPARATORY AND DYEING

Hours Per Week :

L	T	P	C
3	0	2	4

PREREQUISITE KNOWLEDGE: Basics of fiber, yarn and fabric particulars.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers basics of preparatory and dyeing processes for various types of fabrics made from different types of fibers and manufacturing methods. The objective of this course is to impart knowledge on various techniques and methods of preparatory process and dye the different kind of fiberss, yarn and fabric.

MODULE-1

UNIT-1   **10L+0T+0P=10 Hours**

DYEING PREPARATORY PROCESS:

Requirements of water for dye house, wetting, contact angle, detergency, surface active agents and its types; Aims of preparatory processes, preparation of cotton, proteneous and synthetic materials for dyeing. Singeing, Desizing, Scouring - Objectives, processing and evaluation methods for natural and synthetic materials.

UNIT-2   **14L+0T+16P=30 Hours**

BLEACHING AND MERCERIZATION:

Bleaching and Mercerization process for natural and synthetic materials, quality requirements for dyeing at preparatory processes.

PRACTICES:

- Enzymatic Desizing of cotton and effect of desizing fabric properties.
- Conventional Scouring of cotton lea and study its effect on yarn properties.
- H2O2Bleaching and optical Whitening agent treatment of cotton lea and study its effect on fabric properties.
- Bleaching of polyamide/polyacrylics/polyacetates fibers.
- Carbonization and Scouring of wool fabric and its effect on fabric properties.
- Degumming and Bleaching of silk lea and its effect on fabric properties.
- Mercerization of cotton lea and study its effect on properties of cotton yarn.
- Measuring whiteness index of bleached and non-bleached fabric.
- Determination of BAN for mercerized and non-mercerized fabrics.

MODULE-2

UNIT-1   **10L+0T+0P=10 Hours**

DYEING:

Introduction to dyeing - Chemical constitution of colour and its elements, classification of dyes,affinity of dyes for different fibers, Mechanism of dyeing; Dye-fiber interactions; Kinetics of dyeing; Different classes of dyes; Dyeing procedures for natural, protein, synthetic and its blended textile materials.

UNIT-2   **14L+0T+16P=30 Hours**

EFFLUENT TREATMENT:

Effluent treatment: Characteristics, processing and evaluation methods of effluents treatment. Importance of eco-friendly textile processing. Color measurement of textiles; human color vision system; color measuring instruments.

PRACTICES:

- Dyeing of Cotton fabric with direct dyes.
- Dyeing of Cotton fabric with reactive dyes.
- Dyeing of Cotton fabric with Vat colors.
- Dyeing of silk with acid dyes and effect on fabric properties.
- Dyeing of wool with acid dyes and effect on fabric properties.
- Dyeing of polyester with disperse dyes and effect on fabric properties.
- Dyeing of acrylic with basic dyes and effect on fabric properties.
- Determination of K/S value of dyed fabrics.
- Case studies on effluent treatment process

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Identify various preparatory processes required for dyeing of different fibers.	Apply	1	1, 2, 12
2	Analyse the various benefits of preparatory pro-cesses carried out for textile fibers.	Analyse	1	1, 2, 12
3	Determine various conditions meant for dyeing of textile fibers with different classes of dyes.	Analyse	2	1, 3
4	Assessing various parameters effecting the quality of colored textiles.	Evalu-ate	2	1, 2, 12
5	Evaluation of effluents arising out of textile chemi-cal processing industries and its effect on environ-ment.	Evalu-ate	2	7

TEXT BOOKS:

1. J N Chakraborty, "Fundamentals and PRACTICES: in coloration of textiles" Woodhead Publishing Ltd,UK, 2010.
2. Gulrajani M L, "Color Measurement: Principles, Advances and Industrial Applications", Woodhead Publishing Ltd,UK, 2010..

REFERENCE BOOKS:

1. Dr. C. V. Koushik and Mr. Anato Irwin Josico, "Chemical Processing of Textiles - Preparatory process and dyeing"NCUTE Publishers, 2003.
2. A K Roy Choudhury, "Textile Preparation and Dyeing" Science Publishers,January 9, 2006.
3. E.R.Trotman, "Dyeing and Chemical Technology of Textile Fiberss", 3rd ed.,Griffin Publications, SBT Bomboy, Ahmedabad, 1992.
4. V.A.Shenai, "Technology of Bleaching", Vol - 3, Sevak Publication, Bombay,1984.
5. Xin J, "Total Color Management in Textiles", Woodhead Publishing Limited, UK, 2006.

SKILLS:

- ✓ *Perform pre-treatments of all fiber varieties.*
- ✓ *Design suitable dyeing process with selected class of dyes.*
- ✓ *Carryout dyeing and printing of different fiber types.*
- ✓ *Able to control various process parameters to get good quality of dyed fabrics.*

22TP203 ADVANCED CODING COMPETENCY

Hours Per Week :

L	T	P	C
0	0	2	1

PREREQUISITE KNOWLEDGE: Programming in C, Data Structures.

COURSE DESCRIPTION AND OBJECTIVES:

This course helps to understand the impact of the choice of data structures and design strategies to solve the problem in an efficient manner. This course also provides the understanding of advanced graph applications and also throw light in tractable intractable problems.

MODULE-1

UNIT-1   **0L+0T+8P=08 Hours**

STACKS, QUEUES AND SINGLE LINKED LISTS:

PRACTICES:

Problems On Stacks & Queues

- Check if given stack of integers are consecutive or not (could be ascending or descending).
- Find the maximum sum in a sliding window using queues.
- Given a queue of integers, rearrange the elements by interleaving the first half with the second half.
- Given an integer k and a queue of integers, reverse the order of the first k elements of the queue.
- Given a maze in the form of a rectangular matrix filled with O, X or M where O represents an open cell, X represents a blocked cell and M represents landmines, find the shortest distance of every open cell in the maze from its nearest mine.
- For a given parenthesis expression, check whether it is balanced parenthesis or not.
- Reverse a number using stack.
- You are given a string s consisting of lowercase English letters. A duplicate removal consists of choosing two adjacent and equal letters and removing them. We repeatedly make duplicate removals on s until we no longer can.
- Find first Unique character in a string (Queue).
- Implement Tower of Hanoi problem.

Problems On Linked Lists

- Given a random pointer to a random node in a singly linked list, clone the list.
- Given a list rotate the list to the right by k places.
- Remove duplicates from a sorted list.
- Find fractional node in a singly linked list.
- Sort a linked list using constant space complexity.
- Delete a node in start, middle, end of Singly linked list.
- Add a node in start, middle, end of Singly linked list.
- Find whether given single linked list is circular or not.
- Arrange a singly linked list in Descending order.
- Addition of two numbers using Singly Linked List.

UNIT-2   **0L+0T+8P=08 Hours**

DOUBLY LINKED LISTS, CIRCULAR LINKED LISTS:

PRACTICES:

Problems on Double Linked Lists and Circular Linked Lists

- Implement a clockwise rotation of a doubly linked list by N places.
- Count triplets in a sorted doubly linked list whose product is equal to a given value x.
- Find the product of all prime nodes in a doubly linked list.
- Find the count of common nodes in two doubly linked lists.
- Find pairs with given product in a sorted doubly linked list.
- Delete all the even nodes of a circular singly linked list.
- Count nodes in a circular linked list.
- Delete all prime nodes from a circular singly linked list.
- Exchange first and last nodes in a circular linked list.
- Reverse a doubly circular linked list.
- Linear search using a stack of incomplete sub problems.
- 1 2 3 4 5 6 in stack S is push X is pop, SSSSXXSSSXXX.
- Recursively remove all adjacent duplicates.
- Check if a given singly linked list is a palindrome using stack.
- Convert a multilevel singly linked list to a singly linked list.
- Remove duplicates from an unsorted doubly linked list.
- Sort a doubly linked list using insertion sort.
- Check if a doubly linked list of characters is palindrome or not.
- Swap Kth node from beginning with Kth node from end in a Double Linked List.
- Convert a Binary Tree into Double Linked List.

MODULE-2

UNIT-1   **0L+0T+8P=08 Hours**

TREES:

PRACTICES:

Problems on Trees

- Given a sorted doubly linked list, convert it into a balanced BST.
- Given a singly linked list with data in the ascending order, convert it into a height balanced BST.
- Print the leaf to root path for every leaf node in a binary tree.
- Write a function to implement the reversed level order traversal of a binary tree.
- Truncate a given binary tree to remove nodes that lie on a path having sum less than K.
- Find the vertical sum in a given binary tree.
- Delete minimum & Maximum element from a BST.
- Implement Inorder, preorder and postorder tree traversal techniques.
- Print Kth largest element in a BST.
- Implement Zig-Zag tree traversal.

UNIT-2   **0L+0T+8P=8 Hours**

GRAPHS:

PRACTICES:

Problems on Graphs

- Given a directed acyclic graph, determine whether there is a path that visits every vertex exactly once.
- Reverse a directed graph such that each edge from v to w is replaced by an edge from w to v.
- Find the shortest path in a graph that visits each vertex at least once, starting and ending at the same vertex.
- Find the minimum number of throws required to win a snake and ladder game.
- Implement DFS of a Graph.
- Implement BFS of a Graph.
- Detect whether a cycle is present in an undirected graph.
- Detect cycle in a Directed Graph.
- Find Shortest Distance to goal node from root node in a graph.
- Find no. of nodes in Kth level of a Graph.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Apply various data structures to solve a different algorithm.	Apply	1	1
2	Investigate the various data structures to solve a given problem in an efficient manner.	Analyse	2	2
3	Design and implement an appropriate hashing function for an application.	Create	4	4

TEXT BOOKS:

1. D Samantha, "Classic Data Structures", 2nd Edition, Eastern Economic Prentice hall private limited press, 2010.

REFERENCE BOOKS:

1. Ellis Horowitz and Sartaj Sahni, "Fundamentals of Data Structures", illustrated edition, Computer Science Press, 2020.
2. Mark Allen Weiss, "Algorithms, Data Structures and Problem Solving with C++ illustrated", 2nd edition, Addison-Wesley publishing company, 2002.
3. R G Dromey and Pearson, "How to solve it by Computer", 2nd edition, Impression edition, 1998.

22TP204 PROFESSIONAL COMMUNICATION LABORATORY

Hours Per Week :

L	T	P	C
0	0	2	1

PREREQUISITE KNOWLEDGE: High school level English.

COURSE DESCRIPTION AND OBJECTIVES:

To improve the overall professional communication skills (LSRW) of students and prepare them for their profession as engineers and managers. To provide them exposure to conventions of corporate communication and training them on how to function in the business world.

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images?q=tbn:ANd9Gc
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MODULE-1

UNIT-1   **0L+0T+8P=08 Hours**

BASICS OF BUSINESS WRITING SKILLS, PRACTICING BUSINESS CORRESPONDENCE AND REPORT WRITING:

Business English Vocabulary: Glossary of most commonly used words (formal and informal usage).

Elements of Technical Writing: Sentence structure, reducing verbosity, arranging ideas logically, building coherence, cohesive devices and transitional words.

Mechanics of Writing: Elementary rules of grammar, choice of diction, elementary principles of composition, matters of form, punctuation, conventions of business communication, language and professional tone, code of conduct (not sending illegal, offensive, disparaging personal remarks or comments) in written business communication.

Business Correspondence: E-mail: nature and scope, e-mail etiquette, clear call for action, common errors in composing e-mails, office communication such as meeting agenda and notice, circular and memo.

Letter-Writing: Formal and informal letters, structure of formal letters, expressions of salutations, different types of letters [such as sales letter, complaint letter, response to the complaint letter (dispute resolution), letter of permission, letter of enquiring, claim letter – letter of apology etc], introductory and concluding paragraphs and clear call for action.

Professional Proposal/Report: Differentiating proposals and reports, Drafting formal business proposals, types of reports such as factual reports, feasibility reports and survey reports, parts of a report (such as title page, declaration, acknowledgements, table of contents, abstract, introduction, findings, conclusion and recommendations).

New Age Corporate Communication Media: Importance of social media communication and Etiquettes, form and structure, sharing texts through Twitter, Whatsapp, instgram etc.

UNIT-2   **0L+0T+8P=8 Hours**

PRACTICING COMMUNICATIVE LANGUAGE IN VARIOUS PROFESSIONAL CONTEXTS:

Speaking: Speaking in business context, assertiveness, politeness, making requests, queries and questions, negotiations, asking for information, offering suggestions, conflict resolution, contacting clients, initiating, addressing delegates (in public), delivering the presentation effectively, telephone etiquettes, delivering seminar/proposal/report effectively, team meeting etiquettes (face to face and conference call), making effective one minute presentations(JAM) and participating in Group Discussions.

PRACTICES:

- Basic grammar practice, framing paragraphs on topics allocated, paraphrasing an article or a video in your own words, finding topic sentences in newspaper articles, finding out new words from a professional viewpoint and understanding the meaning and its usage.

- Perusing samples of well-prepared business emails, memo, letter writing and short proposals and reports, students will draft business correspondence writing tasks and different proposals/reports on topics assigned.
- Watching videos/listening to audios of business presentations, classroom activities of team and individual presentations, using PPTs, mock exercises for BEC speaking, agreeing, disagreeing politely, developing content, extended speaking in Group Discussion(s).

MODULE-2

UNIT-1   **0L+0T+8P=08 Hours**

READING AND COMPREHENDING BUSINESS DOCUMENTS:

Reading:Reading and comprehending business documents, learning business register, regularizing the habit of reading business news, suitable vocabulary, skimming and scanning a text for effective and speedy reading and dealing with ideas from different sectors of corporate world in different business contexts.

UNIT-2   **0L+0T+8P=08 Hours**

IMPARTING AND PRACTICING LISTENING SKILLS:

Listening: Specific information in business context, listening to telephonic conversations / messages and understanding the correct intended meaning, understanding the questions asked in interviews or in professional settings, summarizing speaker's opinion or suggestion, enable active listening.

PRACTICES:

- Hand-outs; matching the statements with texts, finding missing appropriate sentence in the text from multiple choices, using right vocabulary as per the given context and editing a paragraph.
- Working out BEC/TOEFL/IELTS listening exercises with hand-outs; matching the statements with texts, finding missing appropriate sentence in the text from multiple choice- multiple choices, using right vocabulary in context-editing a paragraph, listening to a long conversation such as an interview and answer MCQ s based upon listening.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Possess comprehensive SKILLS:: in listening and reading business texts in formal context.	Apply	2	7
2	Communicate effectively both in their academic as well as professional environment.	Apply	2, 1	10
3	Clear grasp on the register of business language	Apply	1	8
4	Possess the ability to write business reports and proposals clearly and precisely to succeed in their future.	Create	1	12
5	Make effective presentations and participate in formal context.	Create	2	10

TEXT BOOK:

1. S. Schnurr,"Exploring Professional Communication: Language in Action", London: Routledge, 2013.

REFERENCE BOOKS:

1. Brook Hart Guy,"Cambridge English Business Bench Mark: Upper Intermediate", 2ndEdition: CUP, 2014.
2. Cambridge University Publication, "Cambridge: BEC VANTAGE Practice Papers", CUP, 2002.
3. J. Seely, "The Oxford Guide to Effective Writing and Speaking", OxfordUniversity Press, 2005.

22CT201 ENVIRONMENTAL STUDIES

Hours Per Week :

L	T	P	C
1	1	0	1

PREREQUISITE KNOWLEDGE: General awareness regarding environmental problems and importance of environmental protection.

COURSE DESCRIPTION AND OBJECTIVES:

It is a multidisciplinary subject where we deal with different aspects using a holistic approach. It is evolving to be the education for sustainable and ethical development both at a local and global level. It helps to prepare the next generation and to plan appropriate strategies for addressing environmental issues. It identifies and creates solutions that conserve to manage ecosystem and biodiversity and also helps to eliminate pollutants, toxicants to preserve air, water and soil quality. Environmental education recognizes impacts of global issues, enhances the public awareness and helps to take decisions towards environmentally responsible actions.

Source Image : https:// education.sakshi. com/sites/default/files/ images/2015/11/03/ EnvironmentalStudies. jpg

MODULE-1

UNIT-1   4L+4T+0P=08 Hours

INTRODUCTION TO ENVIRONMENT: NATURAL RESOURCES, ECOSYSTEMS AND BIODIVERSITY:

Environment and sustainable development; Natural resources- forest, water, energy and land resources; Ecosystem–basic structural components, function and interactions in ecosystem, ecological succession.

UNIT-2   4L+4T+0P=08 Hours

BIODIVERSITY   AND CONSERVATION:

Introduction to biodiversity, types of biodiversity- species, genetic and ecosystem diversity; Threats to biodiversity - natural and anthropogenic, species extinctions, man wildlife conflicts; Biodiversity conservation - principles and strategies; in-situ and ex-situ conservation.

PRACTICES:

- Visit to a Biogas plant, Solar Power plant.
- Visit to a local area to document environmental assets – river/pond/lake/forest / grassland / hill /mountain.
- Set up an aquarium.
- Case study: Renewable energy use.

MODULE-2

UNIT-1   4L+4T+0P=08 Hours

ENVIRONMENTAL POLLUTION AND CLIMATE CHANGE:

Air, water, soil, radioactive and noise pollution; Study of different pollutants (SO_x, NO_x, PAN, PAH etc.); Toxicity study; Climate change - greenhouse effect, acid rain, ozone layer depletion.

UNIT-2   4L+4T+0P=08 Hours

POLLUTION CONTROL DEVICES AND WASTE WATER TREATMENT TECHNOLOGIES:

Air pollution control devices - Gravitational settling chambers, cyclonic separators, electrostatic precipitators, fabric filters and bio filters, Wastewater management.

PRACTICES:

● Visit to a sewage treatment plant and waste-water analysis.
● Case study: Recycling Technologies.
● Case study: Effects of contaminants on microorganisms.
● Report writing: 12 principles of green chemistry for environmental sustainability.
● Report writing: Environmental Impact Analysis, Local Disaster Management Plan.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Apply the basic concepts of sustainable development, natural resource utilization and ecology for the purpose of environmental protection	Apply	1	1, 6, 7, 9, 10, 11, 12
2	Design remediation technologies for their abatement	Apply	2	1, 3, 6, 7, 9, 10, 11, 12
3	Analyze the biodiversity of different ecosystems and formulate various conservation approaches	Analyze	1	1, 7, 8, 9, 10, 11, 12
4	Analyze the presence of various environmental pollutants	Analyze	2	1, 6, 7, 9, 10, 11, 12
5	Recommend various waste management approaches and their implementation strategies	Evaluate	2	1, 2, 7, 8, 9, 10, 11, 12

TEXT BOOKS:

1. A. Kaushik and C. P. Kaushik, "Perspectives in Environmental Studies", New Age International Publishers, 5thEdition, 2016.
2. Y. Anjaneyulu, "Introduction to Environmental Science", B. S. Publications, 2015.

REFERENCE BOOKS:

1. B. Joseph, "Environmental Studies", Mc Graw Hill Education, 2ndEdition, 2015.
2. S. Subash Chandra, "Environmental Science", New Central Book Agency, 2011.
3. M.Basuand S.Xavier, "Fundamentals of Environmental Studies", Cambridge University Press, 2016.
4. K. Mukkanti, "A Textbook of Environmental Studies", S. Chand Company Ltd., 2009.
5. M. Anji Reddy, "A Textbook of Environmental Science and Technology", B. S. Publications, 2008.

22MS201 MANAGEMENT SCIENCE

Hours Per Week :

L	T	P	C
2	2	0	**3**

PREREQUISITE KNOWLEDGE: Basic knowledge of management..

COURSE DESCRIPTION AND OBJECTIVES:

The goal of this course is to analyze theimportance of management, significance of operation management and carry out production operations through work-study. Students will be able to analyse the markets, customers, competitors, and then plan HR function effectively. These management practices, functional areas of the organisation will helps the students to build up their career in the corporate world.

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MODULE–1

UNIT-1   6L+6T+0P =12 Hours

INTRODUCTION TO MANAGEMENT:

Concepts of Management and organization- nature, importance and Functions of Management, Systems approach to Management - Taylor's Scientific Management Theory, Fayol's Principles of Management, Mayo's Hawthorne Experiments, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Herzberg's Two-Factor Theory of Motivation, Leadership Styles, Social responsibilities of Management.

UNIT-2   10L+10T+0P=20 Hours

OPERATIONS MANAGEMENT:

Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study -Basic procedure involved in Method Study and Work Measurement, Objectives, Need for Inventory control, EOQ, ABC Analysis, Purchase Procedure, Stores Management and Stores Records. Statistical Quality Control: control charts for variables and attributes (simple problems).

PRACTICES:

- Collect some examples with videos for types of production.
- Carry out production operations through work-study.
- Practice problems with Inventory control methods and Quality Control charts.

MODULE–2

UNIT-1   8L+8T+0P =16 Hours

HUMAN RESOURCES MANAGEMENT:

Concepts of Human Resource Management, Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation, and Merit Rating.

UNIT-2   4L+10T+16P=30 Hours

MARKETING MANAGEMENT:

Evolution of Marketing, Functions of Marketing Selling Vs Marketing, 4 P's of Marketing – Product Mix - Product Life Cycle – Place Mix – Channels of Distribution – Price Mix – Pricing Methods – Promotion Mix – Tools of Promotions.

PRACTICES

- Select any Designation in an organization and try to describe its job description and job specifications.
- How do you deal with grievances at your work.
- Analyze marketing mix in various situations.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Carry out production operations through work-study.	Apply	1, 2	1, 2, 3, 5
2	Analyze the nature and importance of management.	Analyze	1	1, 2, 4, 6
3	Significance of Operations Management.	Analyze	1, 2	1, 2, 5
4	Analyze the markets, customers, and competition.	Analyze	2	1, 2, 4, 5, 6
5	Plan and control the HR function effectively.	Evalu-ate	1, 2	1, 2, 3, 4, 5, 6

TEXT BOOKS:

1. RajanSaxena: Marketing Management, 4th Edition, TMH, 2013.

2. Dilip Kumar Battacharya, Principles of Management, Pearson, 2012.

REFERENCE BOOKS:

1. Philip Kotler, Kevin Lane Keller, Abraham Koshy and MithleshwarJha: Marketing Management, 13th Edition, Pearson Education, 2012.

2. Dipak Kumar Bhattacharyya, Production and Operations Management, Universities Press, 2012.

3. Gary Dessler, "Human Resource Management", 12th Edition, Pearson- 2012.

4. K.Aswathappa, "Human Resource Management", Text and Cases", TMH, 2011.

5. Harold Koontz, Heinz Weihrich, A.R. Aryasri, Principles of Management, TMH,2010.

22TT205 FABRIC STRUCTURE AND DESIGN

Hours Per Week :

L	T	P	C
3	0	2	4

https://i0.wp.com/textilelearner.
net/wp-content/uploads/2021/10/
Fabric-Weave-Structure
jpg?fit=593%2C436&ssl=1

PRE-REQUISITE KNOWLEDGE: Basics of fabric particulars.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers basics of simple and compound fabric structures and designs. The objective of this course is to impart knowledge on various types of fabric structures, constructional details, and its characteristics.

MODULE- 1

UNIT-1   **10L+0T+0P=10 Hours**

BASICS OF FABRIC STRUCTURE:

Introduction to Fabric Structure – types of woven fabric; Method of weave notation. Elements of fabric structure; Design, draft, peg plan, constructional details and Characteristic of Plain, Twill, Satin, Sateen weaves and its derivatives.

UNIT-2   **14L+0T+16P=30 Hours**

FANCY FABRIC STRUCTURE:

Fancy Weaves - Honey comb, Huck-A-Back, Mock leno, and distorted thread effects produced in warp and weft way; Analysing the fabric parameters for its reproduction.

PRACTICES:

- Analyzing fabric particulars and parameters of Plain, twill, satin and sateen and its derivative fabrics.
- Preparation of stripes and checks using 2 or more colors with and without plain weave using table top handloom.
- Practicing simple color and weaves effects using DB weave software.

MODULE- 2

UNIT-1   **10L+0T+0P=10 Hours**

COMPOUND FABRIC STRUCTURES:

Compound fabric introduction - Constructional procedure for Backed cloth, Bed ford cord, welt or piques, double cloth, treble cloth, pile fabric, extra thread design fabric.

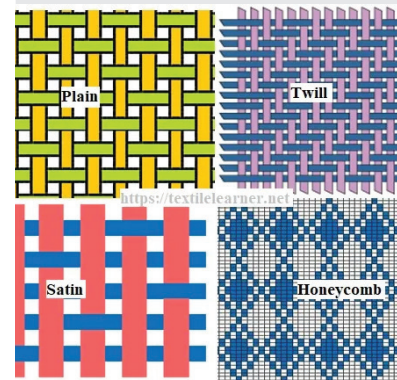**UNIT-2**   **14L+0T+14P=30 Hours**

COMPLEX FABRIC STRUCTURES:

Terry pile, wire pile and gauze and leno fabric structures and producing Mechanisms.

PRACTICES:

- Analyzing fabric particulars and parameters of Backed Cloth, Bed ford cord fabric, Double Cloth, Figuring with extra thread fabric, Terry pile, and Leno fabric.

SKILLS:

✓ *Able to prepare designs for kind of fabric.*

✓ *Recognize type of loom to produce designs.*

✓ *Develop different types of cloth structure in sample loom.*

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Categorize structures of woven fabrics.	Apply	1	1, 2, 12
2	Describe fabric characteristics by its design.	Apply	1, 2	1, 2, 5, 12
3	Investigate kind of fabric and particulars need to reproduce.	Analyse	1, 2	1, 2, 3, 5, 12
4	Construct various fabric designs.	Create	1, 2	1, 2, 12
5	Produce the fabric with required parameters.	Create	1, 2	1, 2, 12

TEXT BOOKS:

1. J. Hayavadana, "Woven fabric structure design and product planning", Woodhead Publishing Ltd, 2014.

2. J. Hayavadana, "Advanced woven fabric design, Woodhead Publishing Ltd, 2018.

REFERENCES :

1. John Reed, "Fabric Structure and Design", Veritas Publications, Hong Kong, 2007.

2. Nisbeth, "Grammar of Textile Design", Mahajan Book Publishers, Ahmedabad, Gujarat, 2004.

3. 1. Z.J. Groscicki, "Watson's Textile Design and Colour", Newness – Butter & Worths, Mahajan Book Publishers, Ahmedabad, Gujarat, 4th Edition, 2006.

4. Z.J. Groscicki, "Watson's Advanced Textile Design", Mahajan Book Publishers, Ahmedabad, Gujarat, 4th Edition 2006.

22TT206 TECHNOLOGY OF KNITS AND NONWOVENS

Hours Per Week :

L	T	P	C
2	2	0	3

Source: https://www. apparelresources. com/wp-content/ uploads/2015/10/ Mayer-Cie.jpg

PRE-REQUISITE KNOWLEDGE: Basics of fabric formation and applications.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers basics of knitting and non-woven fabric production. The objective of this course is to impart knowledge on various methods and production technics of knitted and non-woven fabrics.

MODULE- 1

UNIT-1   8L+0T+0P=8 Hours

WEFT AND WARP KNITTING:

Introduction to Knitting,Comparison of woven, nonwoven and knitted fabrics.

Weft Knitting: Fundamental terms in knitting, classifications of fabric and production methods and techniques of types of stitches, flat knitting; A brief note on straight bar and flat knitting machines; Knitting dynamics: A brief note on forces acting on the needle, linear and nonlinear cams, needle breakages.

Warp Knitting: Elements, a brief note on driving arrangements for guide bars, needle bars and sinker bars, basic lapping movements in warp knitting, Loop formation in Tricot and Raschel knitting machines.

UNIT-2   8L+16T+0P=24 Hours

DEVELOPMENTS IN KNITTING:

Developments and application of electronics in weft and warp knitting machines, production formulas, fabric particulars, yarn quality requirements for knitting, weft knit fabric geometry.

Production calculations of weft knitting machines; Collection, Development of Single jersey and Rib fabrics using knitting machine.

PRACTICES:

- Study the applications of weft and warp knitted fabrics and its functional requirements.
- Case study on various qualities of yarns used for specific application.
- Technical specifications of single jersey and double jersey knitting machines.
- Technical specifications of Tricot & Raschel warp knitting machine.
- Identification of weft & warp knitted fabrics and analysis of weft knitted fabrics.
- Warp knit fabric geometry and calculations.

MODULE- 2

UNIT-1   8L+0T+0P=8 Hours

INTRODUCTION TO NON WOVENS FABRICS:

Introduction to Non-Woven: Definition of nonwoven, nonwovens markets, tailor made classification of nonwoven.

Web formation methods; Dry laid, Air laid, wet laid, Polymer laid web formation techniques and methods. Bonding systems: Mechanical bonding, Hydro entanglement, Thermal bonding, Chemical bonding methods and drying systems.
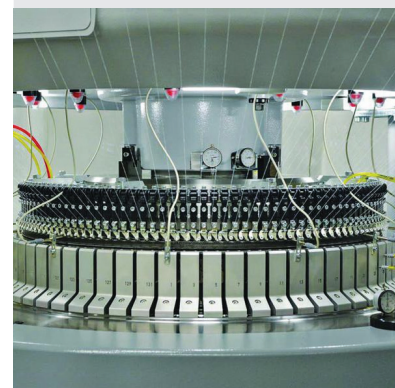
UNIT-2   **8L+16T+0P=24 Hours**

NONWOVENS GLOSSARY OF TERMS:

Nonwovens Glossary of Terms, Nonwovens in daily life - Versatile products for modern life and its properties, fiber selection for different products, parameters controlling the quality.

Finishing of nonwovens: Wet finishing, application of chemical finishes, lamination, mechanical finishes, surface finishes, emerging technologies, 3D nonwoven.

PRACTICES:

- Identification and assessment of different nonwoven fabric structures.
- Advances in technical nonwovens.
- Practice on preparation of nonwoven fabric using any one of the method.
- General standards for testing nonwovens.
- Measurement of basic parameters.
- Measuring tensile properties.
- Measuring water vapour transmission.
- Measuring wetting and liquid absorption.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Develop different weft and warp knitting fabric structures.	Apply	1	1, 2, 3, 5, 12
2	Develop non-woven fabric	Apply	2	1, 2, 12
3	Differentiate woven, knitted and non-woven fabrics	Analyse	1	1, 2, 12
4	Compare warp and weft knitted fabrics.	Analyse	1	1, 2, 5, 12
5	Inspect different nonwoven fabrics and their processes	Analyse	2	1, 2, 12

TEXT BOOKS:

1. S. J. Russel, "Handbook of Nonwovens", 1st edition, Wood Head Publishing in Textiles, 2006.
2. D. J. Spencer, "Knitting Technology", 2nd edition, Wood Head Publishing Company, England, 2008.

REFERENCES :

1. Turbak, "Nonwoven Process Performance & Testing", 2nd edition, Tappi Press, Woodhead Publishing, Cambridge, 1993.
2. W. Albrecht, "Nonwoven Fabric Construction Synthetic Fiberss", JWS Publications, 2007.
3. W B. Azagoankar, "Knitting Technology", Mahajan Textile Publishers, 5th edition, 2006.
4. https://www.edana.org/nw-related-industry/nonwovens-in-daily-life
5. https://www.inda.org/about-nonwovens/nonwovens-glossary-of-terms/

III YEAR

TEXTILE TECHNOLOGY

B.Tech.

COURSE CONTENTS
I SEM & II SEM

22TT301 TESTING OF FABRICS AND GARMENTS

Hours Per Week :

L	T	P	C
3	0	2	4

PREREQUISITE KNOWLEDGE: Basics of fabric and garments particulars.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers basics of testing of fabrics and garments. The objective of this course is to impart knowledge on testing procedures of various fabrics and garments.

Source Image : https://i0.wp.com/textilemerchandising.com/wp-content/uploads/2016/02/UV-Schutz_Pilling_Martindale_20100712_0920_LightboxImage.jpg?fit=660%2C440

MODULE-1

UNIT-1   10L+0T+0P=10 Hours

TESTING OF FABRIC DIMENSION:

Fabric dimensions: Scope of fabric testing; Standards for tests; methods and working of instruments for measuring fabric dimension, tensile, tearing and bursting strength.

UNIT-2   14L+0T+16P=30 Hours

TESTING OF SURFACE CHARACTERISTICS:

Sample preparation and testing procedure for abrasion and Pilling resistance, stiffness, drape and crease recovery of fabric.

PRACTICES:

- Determination of fabric Tensile strength and elongation.
- Determination of fabric Tear strength.
- Testing the fabrics for bursting strength.
- Determination of Ballistic strength of fabrics.
- Determination of fabric thickness by using thickness tester.
- Determination of abrasion resistance of fabrics.
- Testing of fabrics for pilling.
- Determination of stiffness parameters of fabrics.
- Determination of crease recovery angle of cotton, man-made and silk fabrics.
- Determination of Drape co-efficient for textile fabrics.

MODULE-2

UNIT-1   10L+0T+0P=10 Hours

TESTING OF COMFORT PROPERTIES OF FABRIC:

Methods and working of instruments for measuring Air and water permeability; Air, and water vapor transmission, wicking test, wettability; water repellency, friction, thermal resistance, thermal insulation, flammability, color fastness on washing, light, perspiration, and rubbing and Dimensional stability of the fabric.

UNIT-2   **14L+0T+16P=30 Hours**

TESTING OF APPAREL:

Apparel testing - Button impact, seam strength, seam efficiency, seam slippage, needle damage check, size fitting. Fabric handling and evaluation by KES and FAST. Sample preparation and testing procedure for testing of fabric and garments.

PRACTICES:

- Study of dimensional stability of woven fabrics.
- Determination of Air permeability of woven fabrics.
- Wash fastness for different dyed and printed fabrics.
- Determination of water transmission by longitudinal wicking test.
- Blend analysis of fabric by chemical methods.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Prepare samples for testing fabrics and Identify type of instrument need for testing fabrics properties.	Apply	1	1, 2, 5, 12
2	Describe working mechanisms of testing instruments.	Apply	1	1, 2, 3, 5, 12
3	Analyse kind of fabric properties to be check in garment.	Analyse	2	1, 2, 12
4	Correlate the fabric properties related with end use.	Evaluate	1,2	1, 2, 12

TEXT BOOKS:

1. J. E .Booth, "Principle of Textile Testing", Butterworths Publisher, London, 1975.
2. B. P. Saville, "Physical Testing of Textiles", Woodhead Publishing, Limited, 1999.

REFERENCE BOOKS:

1. J. HU, "Fabric testing", The Textile Institute, Woodhead Publishing Limited, 2008
2. Grower and Hamby, "Hand Book of Textile Testing", Textile Institute, 1996.
3. V.K. Kothari, "Developments in Textile Testing", I B Publishers, New Delhi.

22TT302 TECHNOLOGY OF PRINTING AND FINISHING

Hours Per Week :

L	T	P	C
3	0	2	**4**

PREREQUISITE KNOWLEDGE: Basics of fabric and dyeing particulars.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers basics of printing and finishing for fabric. The objective of this course is to impart knowledge on various types of printing and finishing methods used for fabric.

Source Image : https://www.kornit. com/blog/wp-content/ uploads/2018/09/ rolltoroll1.jpg

MODULE-1

UNIT-1   10L+0T+0P=10 Hours

STYLES AND METHODS FABRIC PRINTING:

Printing: Styles, methods and procedure for fabric printing; Preparation of printing paste; Printing with direct, reactive dyes and Pigments.

UNIT-2   14L+0T+16P=30 Hours

DEVELOPMENTS IN PRINTING:

Developments in flat bed, rotary screen printing machine; Inkjet / Digital Printing machine. Fabric Preparation for printing

PRACTICES:

- Printing of cotton with reactive dyes and pigment colours by using screen printing.
- Printing of cotton with pigment color by using screen printing.
- To print cotton fabric with resist style of printing using reactive dye as background.
- To print cotton fabric with discharge style of printing using reactive dye as background.
- To print polyester with disperse dye.
- Case studies on digital printing machine.

MODULE-2

UNIT-1   10L+0T+0P=10Hours

FABRIC FINISHING:

Introduction to finishing and finishing machinery - Object of finishing, importance of textile finishing, classification of finishing, process sequence of finishing of cotton, Wool and silk fabrics; Concept and working of machinery like calendering, decatising, raising, sueding, felting, sanforising, stenter, aero finishing.

Aesthetic, functional and special Finishes, procedures, machineries and evaluation methods for finished goods.

UNIT-21   14L+0T+16P=30 Hours

SOFTENERS AND HAND BUILDE:

Softeners and hand build: Classification and properties, of softeners and stiffeners, examples and their application.

PRACTICES:

- To impart crease recovery property to cotton by DMDHEU based finish and formaldehyde free system.
- Evaluation of light, wash, rubbing and fastness.
- Water repellency to cotton fabric with various chemicals.
- Antimicrobial finish to cotton fabric with various chemicals and its assessments.

COURSE OUTCOMES:

Upon successful completion of this course, students will have to ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Identify type of printing procedure.	Apply	1	1, 2, 12
2	Describe print paste preparations and characteristics.	Apply	1	1, 2, 5, 12
3	Develop various aesthetic and functional characteristics in the fabric.	Apply	2	1, 2, 12
4	Analyse kind of fabric and particulars need to print.	Analyse	1,2	1, 2, 3, 5, 12
5	Produce printed fabric with required parameters.	Evaluate	1,2	1, 2, 12

TEXT BOOKS:

1. W. C. Miles, "Textile Printing", Society of Dyers and Colorist, 2003.
2. V. A. Shenai, "Technology of Printing", Sevak Publication, 1998.
3. Chemical Finishing of Textiles by W. D. Schindler and P. J. Hauser.

REFERENCE BOOKS :

1. J. T. Marsh, "Introduction to Textile Finishing", Textile Trade Press, England,1996.
2. L. W. C. Miles, "Textile Printing", Dyers Company Publication Trust, 1998.
3. V. A. Shenai, "Technology of Finishing", Sevak Publication,1996.
4. R. S. Prayag, "Technology of Finishing", Shree J. Printers,1998.

22TT303 TECHNICAL TEXTILE

Hours Per Week :

L	T	P	C
3	2	0	**4**

PREREQUISITE KNOWLEDGE: Basics of textile materials.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers functional and technical use of textile instead of aesthetic applications. The objective of this course is to impart knowledge on advanced applications of textile material in technical areas.

MODULE–1

UNIT-1   10L+0T+0P=10 Hours

TEXTILES IN PROTECTION:

General technical textiles: Classifications, Scopes, Brief note on technical yarns and fabrics. Textiles in agriculture, horticultural and conveyor belt.

Protective textiles: Requirements and classifications. Brief note on combat clothing system, breathable clothing, camouflage systems, cut resistant textiles, protective clothing for extremely cold region; Ballistic protection armor and accessories; Fabrics for biological and chemical protection.

UNIT-2   14L+16T+0P=30 Hours

MEDICAL AND TRANSPORT:

Medical textiles: Classifications and applications. Brief note on sutures, surgical drapes, masks, blood repellent fabric, implantable and non-implantable devices.

Textiles in transportation: Tyre cord, cross section of passenger tyre, manufacture of tyre cords, types of tyres; Textiles in parachute applications, Seat belt and airbag.

PRACTICES:

- Technical textiles global and Indian market potential.
- Technical textile products used in agriculture and horticultural.
- Comfort clothing for high altitude applications.
- Aerospace textile manufacturing companies.
- Various medical textile manufacturing products.
- Textile materials in tyre cord manufacturing.
- Textile materials in seat belt and air-bag manufacturing.

MODULE –2

UNIT-1   10L+0T+0P=10 Hours

HIGH PERFORMANCE FIBERSS:

High performance fibers: Manufacture, properties and applications of basalt, p-aramid, m-aramid and carbon fibers.

Textiles for filtration, sports, acoustics: Textiles as filtration media, mechanism and method, selection of textiles for filtration; conventional and high performance coated fabrics, coating materials and methods; Textiles for acoustical and sports applications.
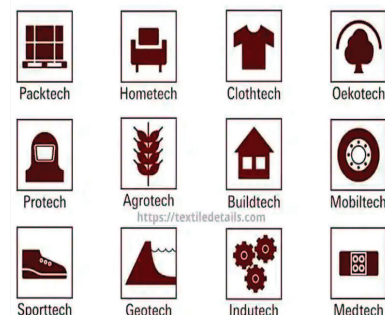
12 Types of Technical Textiles

Source: https://i0.wp.com/textiledetails.com/wp-content/uploads/2021/11/Types-of-Technical-Textiles.jpg

UNIT-2   **14L+16T+0P=30 Hours**

TEXTILES FOR COMPOSITE:

Textiles for composite and construction: Concept of composites, Textile reinforced composites – classifications and applications. High performance PP composites, hybrid yarns for composites and applications; Geo-textiles- requirements, properties, functions, applications. Testing of geo-textiles. Fabrics - Architectural fabrics, awnings and canopies.

PRACTICES:

- High performance fiber products for technical applications.
- Filter fabric products for technical applications.
- Products for sports textile applications.
- Products for geo textile applications.
- Products for composite applications.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Outlining the modern concept of textile.	Apply	1,2	1, 2, 12
2	Preparing the root causes for various problems identified technical textile applications.	Apply	1,2	1, 2, 3, 5, 12
3	Explain the various process parameters related to medical and transport applications.	Analyse	1	1, 2, 5, 12
4	Structuring the principles and mechanisms of advancement in technical textile.	Analyse	1,2	1, 2, 12
5	Apply the knowledge of textile in industrial and technical application.	Evaluate	1,2	1, 2, 12

TEXT BOOKS:

1. A. R Horrocks, S.C. Anand, "Handbook of Technical Textiles", 2ndedition, Woodhead Publishing, Cambridge, 2000.

2. 2. S. Adanur, "Handbook of Industrial Textiles", 2ndedition, Technomic Publication, Lancaster, 2001.

REFERENCE BOOKS:

1. M.C. Kanna, "Design and Manufacture of Textile Composites", Textile Progress", Manchester, April 2004.

2. Shishoo, "Textile in sports", Textile progress, Manchester, August 2005.

3. Fung W., Collins & Aikman, "Textiles in Automotive Engineering", 2nd edition, Wood Head Publishing ltd., UK, 2000.

22TP301 SOFT SKILLS LABORATORY

Hours Per Week :

L	T	P	C
0	0	2	1

PREREQUISITE KNOWLEDGE: Grasp on their own academic achievements.

COURSE DESCRIPTION AND OBJECTIVES:

To impart employability skills like resume preparation and facing interviews. To enable trainees to develop interpersonal and leadership skills and to train them on work place skills like making presentations, participating in group discussions etc.

MODULE-1

UNIT-1   **0L+0T+8P=8 Hours**

PERSONALITY DEVELOPMENT:

Soft Skills: Need for soft skills, professionalism, employability skills; Communication: Need for effective communication - the process of communication, levels of communication, flow of communication, choice of diction and style with reference to setting (formal, semi-formal or informal); communication networks, barriers to communication, miscommunication, noise and ways to overcome the barriers; Career Planning: Job vs. career, SWOT analysis.

UNIT-2   **0L+0T+8P=8 Hours**

LANGUAGE AND VOCABULARY:

Vocabulary Building: Word etymology, roots, prefixes & suffixes, synonyms & antonyms, collocations, one-word substitutes, analogies, idioms and phrases, contextual guessing of unfamiliar words, task-oriented learning; Reflection of language on Personality, Gender sensitive language in MNCs, Mind your language, Seven essential skills for a team player; attentive listening, intelligent questioning, gently persuading, respecting other's views, assisting others, sharing, participating actively.

PRACTICES:

- Self-Introduction.
- Personal and Academic SWOC.
- Johari Window.
- Giving and taking opinions of Self Vs others and assessing oneself.
- Goal setting.
- Short, Mid and Long Term goals planning the semester.
- Time management: four quadrant system.
- Stephen Covey Time Management Matrix planning a semester.
- Stress-management.
- Questionnaire to assess level of stress.
- 50 words towards resume preparation and interviews.
- Newly coined words.
- Gender sensitive words and Words acceptable in Indian context and objectionable international context.

MODULE-2

UNIT-1   **0L+0T+8P=8 Hours**

LANGUAGE IN ACTION:

Functional English: Situational dialogues, Role plays (including small talk); Group Discussion: Articulation and flow of oral presentation, dynamics of group discussion, intervention, summarizing and

Source: https://www.flourmiller.com/blog/why-choose-automatic-flour-mill-plant.html

conclusion, voice modulation, content generation, Key Word Approach (KWA), Social, Political, Economic, Legal and Technical Approach (SPELT), View Point of Affected Part (VAP), language relevance, fluency and coherence - 11th and 12th weeks; Resume preparation: Structure and presentation, defining career objective, projecting one's strengths and skill-sets, summarizing, formats and styles and covering letter-Statement of Purpose.

UNIT-2   **0L+0T+8P=8 Hours**

PREPARING FOR PRESENTATIONS AND INTERVIEWS:

Facing Interviews: Interview process, understanding employer expectations, pre-interview planning, opening strategies, impressive self-introduction, answering strategies, other critical aspects such as body language, grooming, other types of interviews such as stress-based interviews, tele- interviews, video interviews, frequently asked questions (FAQs) including behavioral and HR questions and the aspect looked at by corporate during interviews; Presentation Skills: Selection of a topic, preparing an abstract, gathering information, organizing the information, drafting the paper, citing reference sources – writing striking introductions, discussing the methodology used, developing the argument, presentation style, language, presenting the paper and spontaneously answering audience questions.

PRACTICES:

- Opening and closing a telephonic conversation.
- Making an appointment.
- Making a query.
- Offering/Passing on information.
- Communicating with superiors.
- Expressing agreement/objection.
- Opening bank account (combination of prepared and impromptu situations given to each student).
- Group Discussions on various topics.
- Preparing SoP and Resume.
- Mock interviews on the FAQs including feedback.
- Oral presentation with the help of technology (Preparing PPT and presenting).

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Have the ability to introspect on individual strengths and weaknesses, and emerge as a balanced personality with improved self-awareness and self-worth .	Apply	1	12
2	Observe gender sensitive language and workplace etiquette in his professional life.	Analyze	1	9
3	Be able to prepare a resume and gain the confidence to face an interview.	Create	1&2	10
4	Possess the interpersonal skills to conduct himself/ herself effectively in everyday professional and social contexts.	Apply	2	8
5	Bring professionalism into his/her daily activities.	Create	2	8

TEXT BOOKS:

1. Adrian Furnham, "Personality and intelligence at work", Psychology Press, 2008.
2. S. P. Dhanvel, "English and Soft skills", Orient Blackswan, 2011.

REFERENCE BOOKS:

1. Edward Holffman, "Ace the corporate personality", McGraw Hill, 2001.
2. John Adair Kegan Page, "Leadership for innovation", Kogan, 2007.
3. Krishna Mohan & NP Singh, "Speaking English effectively", Macmillan, 2008.
4. Rajiv K. Mishra, "Personality Development", Rupa & Co. 2004.

22TT306 APPAREL PRODUCTION TECHNOLOGY

Hours Per Week :

L	T	P	C
3	0	2	**4**

PREREQUISITE KNOWLEDGE: Basics of fabric and sewing particulars.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers basic fundamental concepts of Garment manufacturing, cutting machines, types of seams, stitches, needles, feed systems, major settings, fusing, and pressings of a garment. The objective of this course is to impart knowledge on various types of sewing machines, equipment and other machineries used to produce a garment.

MODULE-1

UNIT-1   **10L+0T+0P=10 Hours**

Introduction: Structure of the garment Industry, Types of fabric packages, fabric specifications used in garment industry.

Spreading: Types of Spreading: Manual, semi-automatic, and automatic; Modes and methods of spreading; Marker making, marker efficiency, factors affecting marker efficiency.

Cutting: Introduction to cutting machines - Types and functions of cutting machines used in apparel industry.

UNIT-2   **14L+0T+16P=30 Hours**

BASICS OF SEWING:

Sewing Basics: classification of seams and stitches, Types of needles, parts of needles and their function, needle size, sewing thread, properties of sewing threads.

PRACTICES:

- To perform stitching in different shapes used in training of the sewing operators.
- To study and prepare different types of Seams.
- To study and prepare different types of Stitches.
- To prepare the samples of Darts, Pleats, Tucks.
- To prepare Shirring's, frills and Gathers.

MODULE-2

UNIT-1   **10L+0T+0P=10 Hours**

SEWING MECHANISMS AND FUSHING:

Sewing Technology: Feed systems, machinery and equipment, general sewing, over locking, safety stitching, blind stitching, button holes, bar tacking & button sewing; Sewing problems - Causes and remedies. Seam quality: Effect of stitch type on seam quality, selection of seam and stitch.

Fusing: Construction of fusible interlinings, fusing process, fusing machinery;

UNIT-2   **14L+0T+16P=30 Hours**

PRESSING TECHNOLOGY:

Pressing Technology: machinery and equipment viz. Hand irons, dry iron, electric steam iron, under pressing, top pressing, scissors press, carousel machines, steam dolly, tunnel finishing, controls, handling systems.

PRACTICES:

- To Prepare different types of Plackets.
- To perform fusing operation to garment parts like collars and cuffs.
- To prepare different types of Collars, cuffs.
- To Analyse the garments for quality inspection.
- To Analyse the garment defects and suggest the improvements in prepared garments.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Describe the fundamentals and applied concepts in Apparel Production.	Apply	1,2	1, 2, 12
2	Summarizing the concepts of apparel production in garment manufacturing.	Analyse	1,2	1, 2, 5, 12
3	Organize and suggest various types of garment machinery for a specific.	Analyze	1,2	1, 2, 3, 5, 9, 10
4	application or operation.	Apply	1,2	1, 2, 3, 5, 12
5	Examining the process parameters through industry norms.	Analyse	1,2	1, 2, 12
6	Rating the set of machinery required to produce a specific type of garment.	Evaluate	1,2	1, 2, 12

TEXT BOOKS:

1. Carr, Harold; Latham, Barbara; Tyler, David J, "Carr and Latham's technology of clothing manufacture", 4th Edition, Blackwell Publications, USA, 2008, reprinted on 2020.
2. C. Fairhurst, "Advances in Apparel Production", Blackwell Publications, 2016.

REFERENCE BOOKS:

1. Subramanian Senthilkannan Muthu, "Sustainable Innovations in Apparel Production", Springer Singapore Publishers, London, 2018.
2. David J Tyler, "Materials Management in Clothing Production", Blackwell Publications, USA, 2007.
3. Gerry Cooklin, "Garment Technology for Fashion Designers", Blackwell Science, 1997.

22TT307 ADVANCED YARN AND FABRIC FORMATION

Hours Per Week :

L	T	P	C
2	2	0	3

PREREQUISITE KNOWLEDGE: Basics of yarn and fabric manufacturing.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers advancements of yarn and fabric manufacturing. The objective of this course is to impart knowledge on advanced technology and machineries used in spinning mills and weaving industries.

Source: https://5.imimg. com/data5/SELLER/ Default/2021/2/XV/EO/ UM/3160589/air-jet-loom-1000x1000.jpg

MODULE –1

UNIT-1   **10L+0T+0P=10 Hours**

ADVANCEMENTS IN SPINNING:

Limitations of ring spinning - Principles of open end spinning, classification of open end spinning; Principles, passage of material, technical parameters, machine construction and elements and arrangements; Twist less spinning; Self twist spinning, Air Jet spinning; DREF spinning and SIRO spinning.

UNIT-2   **10L+12T+0P=22 Hours**

TEXTURING:

Texturing - objective, Concept, types of texturing; Methods of texturizing; Mechanism of texturizing; Principles, working, construction, properties and applications of Draw textured yarns, Stuffer Box crimping, Gear Crimping, Air texturing, Knit-de-knit texturing, Edge crimping; Textured yarn defects; Texturing problems; bi-component fiberss.

PRACTICES:

Yarn Properties of advanced spinning techniques.

- Study of Yarn properties and applications of various spinning techniques.
- Comparison of ring, rotor, air-jet and friction yarns.
- Comparison of siro yarn and double yarn.
- Comparison of Textured filament and spun yarns.

MODULE-2

UNIT-1   **10L+0T+0P=10 Hours**

SHUTTLE LESS WEAVING:

Shuttle less weaving - Introduction, **Principles of weft insertion in shuttleless weaving -** Various principles, weft insertion rates, applications, Index wheel, cross rod, electromechanical warp stop motion. **Gripper projectile loom** - Salient features, various elements, working elements and weft, insertion stages; Torsion bar picking; Tuck in selvedge formation. **Rapier weaving** - Concept, types, principles of tip to tip transfer, weft insertion cycles, rapier drives. **Air jet weaving** - Principle of weft insertion, machine elements, functions, weft insertion cycles. **Water jet weaving** - Principles of weft insertion.

UNIT-2   **10L+12T+0P=22 Hours**

MULTIPHASE WEAVING:

Multiphase weaving - Concept, shedding, weft winding & beat up arrangements. **Circular weaving** - Passage of material, shedding, picking and beat up arrangements. Introduction to Tri axial weaving. **Selvedge** - Types, mechanisms, selection and requirement. Cloth wind up systems - various batching methods; Cyclops and their use. **Weft accumulators** - Concept, principle, types and selection.

PRACTICES:

- Comparison between shuttle and shuttle less weaving.
- Yarn quality requirement for shuttle less looms.
- Techno-economics of conventional and modern methods of weaving.
- Identifying different selvedges from shuttle less loom fabrics.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Outlining the modern concept of yarn and fabric formation.	Apply	1,2	1, 2, 12
2	Preparing the root causes for various problems identified in modern mills	Apply	1,2	1, 2, 3, 5, 12
3	Explain the various process parameters effecting yarn and fabric quality	Analyse	1,2	1, 2, 5, 12
4	Structuring the principles and mechanisms involved in the advanced textile machines.	Analyse	1,2	1, 2, 12
5	Apply the knowledge of spinning and weaving new fabrics for industrial application.	Evalu-ate	1,2	1, 2, 12

TEXT BOOKS:

1. Technology of Yarn Production - C.W.Lawrence, Wood Head Publishers, London, 2004.

2. Weaving Technology, Management & Machinery - Sri Ramulu, Ajagoanker and Talukdar, Mahajan Publications, Ahmedabad 2008.

REFERENCE BOOKS:

1. Theory of Yarn Production-P.R.Lord & Cherian Iype,Wood Head Publishers, Wales, U.K, 2005

2. Modern Methods of Yarn Production – W.Klein, Textile Institute Manchester, 1990.

3. Recent Developments in Yarn Production – K.R.Salhotra, Textile Association, Bombay 1983.

4. Conversion of yarn to fabric – P.R.Lord & Mohammed, Marrow, Publishers, Manchester, 2004.

5. Principles of Weaving – Robinson and Marks, The Textile Institute, Manchester, 2003.

22TP302 QUANTITATIVE APTITUDE & LOGICAL REASONING

Hours Per Week :

L	T	P	C
1	2	0	2

PREREQUISITE KNOWLEDGE: Basic Logical Thinking and Problem Solving Ability.

COURSE DESCRIPTION AND OBJECTIVES:

The Students will be introduced to various Arithmetic and Reasoning Problems. The students will have acquaintance with various problems like Time & Work, Time & distance, Percentages, Profit & Loss etc. besides solving puzzles and Critical Reasoning.

MODULE-1

UNIT-1   **4L+8T+0P=12 Hours**

Number system, LCM & HCF of numbers, Percentage, Ratio and proportion, Profit, loss and discount, Average & Mixtures, Simple Interest & Compound interest.

UNIT-2   **4L+8T+0P=12 Hours**

Time and work, Time & distance, Problems on trains, Problems on ages, Permutation & Combinations, Probability.

PRACTICES:
- Each concept would be taught in detail in the class followed by 10 problems solved in the class. Students would have to solve 10 additional problems as homework assignment in each concept.

MODULE-2

UNIT-1   **4L+8T+0P=12 Hours**

Number series, Letter series, Analogy, Odd man out, Coding and decoding, Syllogisms- Statement & Conclusions, Puzzle test.

UNIT-2   **4L+8T+0P=12 Hours**

Blood relations, Direction sense test, Order & Ranking, Seating Arrangements, Calendar & Clocks.

PRACTICES:
- Each concept would be taught in detail in the class followed by 10 problems solved in the class. Students would have to solve 10 additional problems as home work assignment in each concept.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Meet the demands of current job market besides equipping them higher studies like CAT, GMAT etc.	Apply	1	2, 5
2	Solve Arithmetic and Reasoning Problems within shortest possible time without paper work.	Apply	1	2, 5
3	Exhibit better analytical skills and aptitude skills.	Analyse	2	2, 4
4	Develop interpretational skills.	Evalua-tion	2	2, 4

SKILLS:

✓ *Helps in developing and improving problem solving skills*

✓ *Allow students to develop critical thinking skills*

TEXT BOOKS:

1. R. S. Aggarwal- Quantitative Aptitude for Competitive Examinations- S. CHAND Publications- Revised Edition-2017.

2. ARIHANT- A New Approach To Verbal & Non-Verbal Reasoning- Arihant Publication- Revised Edition-2021.

REFERENCE BOOKS:

1. Trishna Knowledge Systems- Quantitative Aptitude for Competitive Examinations- Pearson Publication- First Edition- 2013.

2. R. S. Aggarwal- A Modern Approach to Verbal & Non-Verbal Reasoning-S. CHAND Publications- Revised Edition-2018.

IV

YEAR

B.Tech.

TEXTILE TECHNOLOGY

I SEMESTER

- 22TT401 - Process Control in Textile Manufacturing
- 22TT402 - Industrial Engineering for Textiles and Apparels
- - Department Elective – 5
- - Department Elective – 6
- - Department Elective – 7
- - Department Elective – 8
- - Minor / Honors – 4

II SEMESTER

- 22TT403 - Internship / Project Work

COURSE CONTENTS

I SEM & II SEM

22TT401 PROCESS CONTROL IN TEXTILE MANUFACTURING

Hours Per Week :

L	T	P	C
3	2	0	4

PREREQUISITE KNOWLEDGE: Basics of textile manufacturing.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers the fundamental concepts in process and quality control in spinning, weaving, knitting, processing and garmenting. The object is to impart knowledge in processes carried out in textile industries with respect to process control.

Image Source: https://3. bp.blogspot.com/-6-Vb404m88Q/ WGZfPnUUc7I/ AAAAAAAAECw/ e6YFbrBqUtUaRh3h TYc2g7XxcLUYRXfsgCK4B/ s1600/quality-control-importance.png

MODULE-1

UNIT-1   **10L+0T+0P=10 Hours**

SPINNING AND WEAVING PREPARATORY:

Process control in spinning – process control concepts in mixing, blow room, carding, comber, draw frame, simplex and spinning machines.

Process control in preparatory process of fabric manufacturing- process control concepts in warp winding, warping and sizing.

UNIT-2   **14L+16T+0P=30 Hours**

WEAVING :

Process control in fabric manufacture- Process control concepts in weaving process and maintenance of conventional and modern loom shed.

PRACTICES:

- Case studies on maintenance of blow room machineries.
- Case studies on maintenance of carding machine.
- Case studies on maintenance of drawing machine.
- Case studies on maintenance of simplex machine.
- Case studies on maintenance of spinning machine.
- Case studies on maintenance of winding machine.

MODULE-2

UNIT-1   **10L+0T+0P=10 Hours**

PROCESS CONTROL IN WET PROCESSING:

Process control in coloration process and control in pre-treatments - Scope, functions of control house, grey cloth inspection; Process control measures in bleaching and mercerizing. Process control in dye house - Parameters for process control in different forms of dyeing. Process control in printing and finishing - Scope, approach to process control.

✓ *Prepare a project for Textile and Garment industry.*

✓ *Select plant location and machinery for project.*

✓ *Analyse best PRACTICES: for material handling.*

✓ *Set standard operating procedures.*

UNIT-2   **14L+16T+0P=30 Hours**

KNITTING:

Process control in knitting - Key control points in knitting, qauality control of knitted fabrics, control of knitted loop length, common faults in knitted fabrics, other process control factors in knitting. Process control in nonwovens production - Hydro entanglement, process variables and process control; Melt blowing - Process variables and process control; Spun bonding - Process variables and process control Introduction. [Process control in apparel manufacturing - Introduction, process control in spreading, pattern making and cutting, process control in sewing, causes of damage to the fabric during sewing; Control of fusing and pressing operations; Storage and packaging; Quality evaluation of apparel - Testing for tailorability, testing for sewability, evaluation of accessories]

PRACTICES:

- Industrial visit on spinning mill.
- Industrial visit to knitting industry.
- Industrial visit on weaving mill.
- Industrial visit on processing and garment industries.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1.	Control the quality of Wound package and Warper's beam.	Apply	1	1, 2, 5, 12
2.	Standardize the process conditions in Yarn sizing.	Apply	1	1, 2, 3, 5, 12
3.	Identify the key areas in process control of Loom shed.	Analyse	2	1, 2, 12
4.	Plan for the production of quality finished fabric.	Evaluate	2	1, 2, 12

TEXT BOOKS:

1. Process control in textile manufacturing, Edited – Abhijit Majumdar, ApurbaDas, R. Alagirusamy and V. K. Kothari, Woodhead Publishing Series in Textiles: Number 131, 2013.

2. Process& Quality Control in Spinning – ATIRA, 2014. 3. Process & Quality Control in Wet Processing – ATIRA, 2014.

REFERENCE BOOKS:

1. Handbook of Quality Control and Testing – Grover & Hamby, Merrow Publishers, London, 2009.

2. Norms for Textile Industries: ATIRA , BTRA ,SITRA & NITRA.

22TT402 INDUSTRIAL ENGINEERING FOR TEXTILES AND APPARELS

Hours Per Week :

L	T	P	C
3	2	0	**4**

PREREQUISITE KNOWLEDGE: Basics of garment industries.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers to understand the methods required to set the targets, principles involved to set-up a manufacturing unit and best work PRACTICES: to get better quality and higher production. Objective of this course is to impart designing skills to standardize the work practices in apparel industries.

Image Source: https://www.just-style.com/wp-content/uploads/sites/27/2021/05/2019-08-01-15-11-screenshot20190729at08.05.19_cropped_80-8.png

MODULE-1

UNIT-1   **10L+0T+0P=10 Hours**

INTRODUCTION TO INDUSTRIAL ENGINEERING:

Concepts of production and productivity: Production, Productivity, Productivity measures, scope of industrial engineering in textile & apparel.

Role of industrial engineer: Tools and techniques for apparel engineering, Role of industrial engineer in textile industries, Pre-production activities of a supervisor.

Method analysis: Definition, Recording the method, Operation process chart, Flow process chart, Flow diagram, String diagram, Travel chart, Multiple activity chart (or) man–machine chart.

Motion economy: Principles of motion economy, two-handed process chart, micro motion study, study of method recorded, methods improvement; Production systems in textile industries.

UNIT-2   **14L+16T+0P=30 Hours**

PLANT LAYOUT:

Plant layout: Definition, objectives of scientific layout, principles of layout, types of material flow, factors governing the layout, types of layouts, merits and demerits, textile examples; Quantitative techniques for selection of plant layout.

PRACTICES:

- Design a layout for spinning mill.
- Design a layout for Weaving mill.
- Design a layout for garment industry.
- Prepare flow chart for men's shirt.
- Prepare a travel chart for garment industry.

MODULE–2

UNIT-1   **10L+0T+0P=10 Hours**

WORK STUDY:

Work study - Definition and procedure of work study, factors effecting work study, ergonomics.

Work measurement - Definition of work measurement, techniques of work measurement, time study, selecting the job, standard allowed minutes (SAM), rating factor, allowances; other methods to set time standards.

Method study - Definition and objectives, steps involved in method study, tools of record;

Time study - Definition and objectives, steps, elements, allowances, work measurement and derivation for standard minute value through PMTS and standard allowed minutes through time study.

Scientific method of training - Scientific method of training, methodology behind SMT, selection test, basic exercise, paper exercise, fabric exercise.

UNIT-2   **14L+16T+0P=30 Hours**

BALANCING OF MACHINERIES:

Balancing of machineries: objective, importance, factors to be consider for balancing textile machines.

PRACTICES :

Balancing of machineries: objective, importance, factors to be consider for balancing textile machines.

- Prepare spin plan for 25,000 spindle capacity spinning mill.
- Prepare spin plan for 50,000 spindle capacity spinning mill.
- Prepare spin plan for 1,00,000 spindle capacity spinning mill.
- Calculate ex- mill price for 1-meter fabric.
- Calculate cost requirement for set up a small scale garment industry.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Outlining industrial engineering concepts.	Apply	1,2	1, 2, 12
2	Preparing chart for proper utilization of machineries.	Apply	1,2	1, 2, 3, 5, 12
3	Explain the various methods involved in industrial engineering.	Analyse	1,2	1, 2, 5, 12
4	Structuring proper garment manufacturing section.	Analyse	1,2	1, 2, 12
5	Managing all industrial activities.	Create	1,2	1, 2, 12

TEXT BOOKS:

1. V Ramesh Babu, "Industrial engineering in apparel production", Woodhead Publishing India, 2012.
2. Introduction to Work Study, International Labor Office, Publisher: International Labour Office, Year: 1992, ISBN: 9221071081,9789221071082.

REFERENCE BOOKS:

1. O.P. Khanna, "Industrial Engineering& Management", Dhanpat Rai & Sons, New Delhi, 2004.
2. Michael L. George, Lean Six SIGMA: Combining Six SIGMA Quality with Lean Production Speed, McGraw Hill, 2002.
3. Pascal Dennis, Lean Production Simplified: A Plain-Language Guide to the World's Most Powerful Production System, (Second edition), Productivity Press, New York, 2007.

DEPT. ELECTIVES

B.Tech.

TEXTILE TECHNOLOGY

COURSE CONTENTS
I SEM & II SEM

22TT801 PATTERN MAKING

Hours Per Week :

L	T	P	C
2	2	0	3

PREREQUISITE KNOWLEDGE: Basics of pattern making.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers fundamental concepts of pattern making for men, and women. Objective of this course is to provide fundamental knowledge and skill related to taking measurement of human body and converting pattern to produce garment.

Source: https://
d2culxnxbccemt.cloudfront.
net/craft/content/
uploads/2013/08/28114847/
download-2020-09-
28T104841.792.jpeg

MODULE-1

UNIT-1   8L+0T+0P=8 Hours

ANTHROPOMETRICS AND PATTERN TERMINOLOGIES:

Anthropometry measurements, human anatomy, landmark terms, Important body measurements across all age groups. Functions of pattern making tools, preparation of dress form , pattern grain line, balance line terms, notches, seam allowance, jog seam, dart points, pleats, flares, gather and true bias, trueing, blending.

UNIT-2   8L+16T+0P=24 Hours

PATTERNS FOR TOPS:

Basic block for men and women – front bodice draft, back bodice draft, sleeve, adding seam allowance and pattern information.

PRACTICES:

- Measuring the Form – Male, female and child.
- Formulating standard measurement chart.
- Single dart series slash spread technique.
- Single dart series pivotal transfer technique.
- Double dart series slash spread technique.
- Double dart series pivotal transfer technique.

MODULE-2

UNIT-1   8L+0T+0P=8 Hours

PATTERNS FOR BOTTOMS:

Pant foundation – front and back, waist band; pant derivatives; skirt foundation – front and back, patterns for A- line skirt, circular skirt and gathered skirt.

UNIT-2   8L+16T+0P=24 Hours

PATTERNS FOR COLLARS AND SLEEVES:

Collar classification and terms, peter pan collar, sailor collar, mandarin collar, built-up neck lines, cowls, sleeve cap, sleeve cuffs, puff, petal, lantern and leg-of-mutton sleeves .

PRACTICES:

Flat pattern techniques and grading.

- Dart manipulation.
- graduated and radiating darts.
- grading process.
- grade rules and types of grading system.
- Industrial visit to garment industry.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Clothing sizing system and body measurements.	Apply	1	1, 2, 3, 5, 8, 10, 12
2	Drafting and pattern preparation.	Apply	1, 2	1, 2, 4, 6, 10
3	Dart manipulation and grading process.	Analyse	1, 2	1, 2, 4, 5, 8, 10
4	Reviewing all the essential characteristics of pattern.	Evaluate	2	1, 2, 5, 9, 10, 12

TEXT BOOKS:

1. Helen Joseph Armstrong., "Patternmaking for Fashion Design", Pearson Education Pvt Ltd., 2005,ISBN: 067398026X | ISBN-13: 9780673980267.

2. Fan J., Yu W., and Hunter L., "Clothing Appearance and Fit: Science and Technolog", Wood head Publishing Limited, 2004, ISBN: 1855737450 | ISBN-13: 9781855737457.

REFERENCES BOOKS:

1. Ashdown S., "Sizing in Clothing", Wood head Publishing Limited, 2007, ISBN: 1845690346 | ISBN-13: 9781845690342.

2. Jacob Solinger., "Apparel Production Handbook", Reinhold Publications,1998, ISBN: 1879570009 / ISBN: 978-1879570009.

3. Winifred Aldrich., "Metric Pattern Cutting for Children's Wear and Baby Wear", Blackwell Publishing, 2009, ISBN: 140518292X | ISBN-13: 9781405182928.

4. Carr H., and Latham B., "The Technology of Clothing Manufacturing", Blackwell Science, U.K.,1994, ISBN: 0632037482 | ISBN-13: 9780632037483.

5. Ruth E. Glock., and Grace I. Kunz., "Apparel Manufacturing, Sewn Product Analysis", fourth edition, Pearson Education,2004, ISBN: 0131119826 ISBN-13: 9780131119826.

22TT802 GARMENT CONSTRUCTION TECHNIQUES

Hours Per Week :

L	T	P	C
2	2	0	3

PREREQUISITE KNOWLEDGE: Basics of garment making

COURSE DESCRIPTION AND OBJECTIVES:

This course offers fundamental concepts of Structure and morphology of textile fiberss and Physical characteristics textile fiberss. Objective of this course is to provide fundamental knowledge and skill related to find textile fiberss and its characteristics.

MODULE - 1

UNIT-1   **8L+0T+0P=8 Hours**

SPREADING AND CUTTING:

Basics of fabric spreading, modes of spreading, different fabric packages, spreading tension, uniformity and alignment, woven fabric lay, knitted fabric lay, types of fabric lay, Lay planning principles. Marker making, principles of marker making, types of markers, marker planning and marker efficiency, and fabric design parameters on markers, matching and grain line. Fabric cutting methods, latest fabric cutting equipments, and record keeping in cutting room, advancements in cutting room technology.

UNIT-2   **8L+16T+0P=24 Hours**

BASIC SEWING TECHNIQUES:

Seams: Definition, Types of seams, seam quality, seam performance, factors to be considered in the selection of seam, seam finishes, seam defects. Stitches: Definition, stitch classes, stitch parameters, factors to be considered in the selection of stitches. Stitching defects. Sewing Thread: Types, construction, sewing thread quality, selection of sewing thread.

PRACTICES:

- Stitch classification and stitch properties.
- Formation of Stitch classes.
- Seam classification and common uses.
- Sewing practice of – superimposed seam, lapped seam, bound seam and flat seam.
- Button hole and button stitch machine.
- Study of Feed-of-the-arm machine.

MODULE-2

UNIT-1   **8L+0T+0P=8 Hours**

GARMENT COMPONENTS FOR MEN'S AND WOMEN'S TOP:

Men's and women's tops – basic bodice blocks, collars, sleeves, cuffs, plackets – types, pleats, gathers and darts, functional purpose of components in garment construction.

UNIT-2   **8L+16T+0P=24 Hours**

GARMENT COMPONENTS FOR MEN'S AND WOMEN'S BOTTOM:

Men's and women's bottom – trousers basic blocks, pockets – side pocket, welt pocket, patch pocket, yoke, skirt basic blocks, waist bands, panels, other components in innerwear, functional purpose.

PRACTICES:

- Labels.
- Linings and interlinings.
- Wadding and lace.
- Braid and elastic.
- hook and loop fastening.
- shoulder pads.
- eyelets and laces.
- zip fasteners, buttons.
- Industrial visit to garment industry.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Types of seams and stitches, sewing threads & their quality.	Apply	1	1, 2, 3, 5, 8, 10, 12
2	Various garment parts and their variations.	Apply	1, 2	1, 2, 4, 6, 10
3	Use of accessories for garments.	Analyse	1, 2	1, 2, 4, 5, 8, 10
4	Reviewing all the essential parts in the garment.	Evaluate	2	1, 2, 5, 9, 10, 12

TEXT BOOKS:

1. Jacob Solinger, "Apparel Production Handbook", Reinhold Publications,1998.
2. Carr H and Latham B., "The Technology of Clothing Manufacturing", Blackwell Science, U.K.,1994.

REFERENCE BOOKS:

1. Ruth E. Glock, Grace I. Kunz, "Apparel Manufacturing, Sewn Product Analysis", fourth edition, Pearson Education, ISBN: 8177580760159 4.
2. Laing R.M., Webster J, "Stitches & Seams", The Textile Institute, India,1998.
3. Shaeffer Claire, "Sewing for the Apparel Industry", Prentice Hall, New Jersey, 2001.
4. Singer, "Sewing Lingerie", Cy De Cosse Incorporated, 1991.
5. Patty Brown & Janett Rice, "Ready-To-Wear Apparel Analysis'", Third Edition, PrienticeHall Inc., New Jersey,ISBN:0130254347.

22TT803 CHARACTERISTICS OF TEXTILE FIBERS

Hours Per Week :

L	T	P	C
2	2	0	3

Source: http:// gpktt. weebly.com/ uploads/3/7/5/5/ 37553617/405502589. png

PREREQUISITE KNOWLEDGE: Basics of textile fibers.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers fundamental concepts of Structure and morphology of textile fiberss and Physical characteristics textile fibers. Objective of this course is to provide fundamental knowledge and skill related to find textile fibers and its characteristics.

MODULE - I

UNIT-1   **8L+0T+0P=8 Hours**

PHYSICAL PROPERTIES OF TEXTILE FIBERSS:

Introduction of fiber; study of morphological structures; order and disorder in fibres structure; molecular conformations – planar zig-zag, helical, lamellar, and sperulite conformations, physical properties of fibres, Transmission and Scanning electron microscopes-principle; construction and working; X-ray diffraction techniques – estimation of crystallinity; Infrared radiation and dichroism techniques; chemical element and group identification by transmittance and optical density methods, molecular orientation estimation.

UNIT-2   **8L+16T+0P=24 Hours**

SORPTION AND ABSORPTION BEHAVIOR:

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

PRACTICES:

- Analysis of the morphology of a natural and synthetic.
- Calculate the contact angle of the different substrates made from natural and synthetic fibres.
- Analysis of the wicking behaviour of textile materials.
- Calculate the water holding capacity of the fabric made from different fibre.
- Study the Moisture vapour behaviour of material made from natural fibre.
- Study the Moisture vapour behaviour of material made from synthetic fibre
- Study the Moisture vapour behaviour of material made from cotton / polyester fibre.

MODULE-2

UNIT-1   **8L+0T+0P=8 Hours**

TENSILE AND ELONGATION CHARACTERISTICS:

Tensile characteristics –study of strength, elongation, work of rupture, initial modulus, work factor and yield point – determination of yield point. stress-strain relations of natural and manmade fibres - influence of fibres structure, humidity and temperature on tensile characteristics. time effects- study of creep phenomena. Elastic recovery and its relation to stress and strain of fibres; mechanical conditioning of fibres and its influence on elastic recovery. load cycling and extension cycling-their effect on elastic recovery. introduction about torsional and flexural rigidity of fibres.
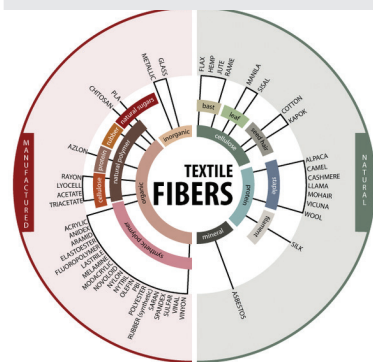
UNIT-2   **8L+16T+0P=24 Hours**

REFLEXION AND LUSTRE:

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

PRACTICES:

- Preparation of a stress-strain curve for different types of fibres.
- Calculate the creep of a filament.
- Analysis of XRD patterns of various fibers.
- Determination of moisture regain and moisture content of fibers.
- Analysis of Thermograms of fibers.
- Industrial Visit.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Articulate the sorption and absorption behavior of fiberss	Apply	1, 2	1, 2, 4, 6, 10
2	Categorizing characteristics of fibers.	Analyse	1	1, 2, 3, 5, 8, 10, 12
3	Appraising different classes of fibers used for various applications.	Analyse	1, 2	1, 2, 4, 5, 8, 10
4	Reviewing all the essential characteristics of fibers.	Evalu-ate	2	1, 2, 5, 9, 10, 12

TEXT BOOKS:

1. Morton W.E. and Hearle J.W. S,"Physical Properties of Textile Fibers", The Textile Institute, Washington D.C., 2008, ISBN978-1-84569-220-95.
2. HearleJ.W.S.LomasB.,andCookeW.D.,"AtlasofFibersFractureandDamagetoTextiles", The Textile Institute, 2ndEdition, 1998, ISBN:1855733196.

REFERENCE BOOKS:

1. Meredith R., and Hearle J. W. S., "Physical Methods of Investigation of Textiles", Wiley Publication, New York, 1989, ISBN: B00JCV6ZWU ISBN-13.
2. MukhopadhyayS. K., "Advances in Fibers Science", The Textile Institute,1992, ISBN: 1870812379.
3. MeredithR.,"MechanicalPropertiesofTextileFiberss",NorthHolland,Amsterdam,1986,ISBN: 1114790699, ISBN-13:9781114790698.
4. RaheelM. (ed.)., "Modern Textile Characterization Methods", Marcel Dekker, 1995, ISBN:0824794737.
5. Mukhopadhyay. S. K., "The Structure and Properties of Typical Melt Spun Fiberss", Textile Progress, Vol. 18, No. 4, Textile Institute, 1989, ISBN:1870812115.

22TT804 TECHNOLOGY OF MANUFACTURED FIBERS

Hours Per Week :

L	T	P	C
2	2	0	3
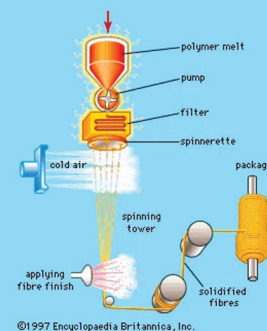
PREREQUISITE KNOWLEDGE: Basic knowledge of synthetic fiberss

COURSE DESCRIPTION AND OBJECTIVES:

The main objective of this course is to impart the knowledge of different principles of forming manmade fibers. It also enables the students to know the different fibers structures and its effects on fiber properties. It also includes the concepts of micro fibers and texturizing of manmade fibers. .

MODULE-1

UNIT-1   **8L+0T+0P=8 Hours**

INTRODUCTION TO MANMADE FIBERS:

Introduction to manmade fibers: Distinction between natural and man-made fibers for production, properties & end uses; Important operations in the production of synthetic fibers; Fibers varying substrate and geometry; Principles of fibers forming polymers, parameters influencing the quality, glass transition temperature.

Introduction to solution spinning: Salient features of solution spinning; Principles of wet and dry spinning, rheology of wet & dry spinning, comparison, a brief note on dry jet wet spinning.

UNIT-2   **8L+16T+0P=24 Hours**

MELT SPINNING:

Detailed note on elements on melt spin equipment, various zones in extruders, design of extruder, types of extruders, characteristic feature of extruder, types of spin pack assemblies, construction of spinnerets, spinneret cleaning methods, Rheology of melt spinning.

PRACTICES:

- Variables of melt spinning.
- High speed spinning concept (integrated spin drop process.
- H4 s and FDY process). Stretching and drawing.
- Drawing condition phenomena of necking.
- Drawing behavior of thermoplastic polymer.
- Influence of drawing on structure and property.

MODULE-2

UNIT-1   **8L+0T+0P=8 Hours**

SPIN FINISHES:

Spin finishes : Objectives, types of spin finish, application methods, problems of application, Ideal spin finish, constitution of spin finish, problems in removal of spin finish; Manufacture of Rayons; viscose rayons, manufacturing process, physical and chemical properties. A brief note on recent developments in modal and Tencil fiber manufacturing (Lyocell fibers); Manufacture, properties and applications of acrylics, modacrylics, polypropylene fibers.

Source: https://www.britannica.com/technology/man-made-fiber/Processing-and-fabrication

UNIT-2   **8L+16T+0P=24 Hours**

MICRO FIBERSS:

Micro fiberss : Methods of production, bi-component technology, meltblown process, properties and applications of micro fiberss, problems in processing of micro fiberss in weaving. NANO FIBER : Methods of production, properties, applications. **Spandex Fiber** : Methods of production, properties, applications .

PRACTICES:

- Case studies on polyester manufacture.
- Case studies on manufacture of nylon 6.
- Case studies on manufacture of nylon 6,6.
- Case studies on manufacture of nylon 6,10.
- Case studies on manufacture of PAN.
- Case studies on manufacture of PP.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1.	Interpret different manmade fibers based on their origin.	Apply	1	1, 2, 4, 5, 9, 10, 12
2.	Compare the change in properties of filaments before and after Apply spin finishes.	Apply	1, 2	1, 2, 3, 5, 9, 10
3.	Various principles of forming manmade fibers and its effect on properties of fibers.	Analyse	1, 2	1, 2, 3, 5, 9, 10
4.	Select the monomers and polymerization technique based on the final properties required.	Analyse	2	1, 2, 5, 9, 10, 12
5.	Assessing performance of fiberss.	Evaluate	1, 2	1, 2, 3, 4, 5, 9, 10, 12

TEXT BOOKS:

1. V. B. Gupta, "Technology of Manufactured Fiberss", 3rd edition, Chapmen and Hall, New York, 2004.

2. A. Vaidya, "Production of Synthetic Fibers", Prentice Hall of India, New Delhi, 2005.

REFERENCE BOOKS:

1. S. P. Mishra, "Fibers Science and Technology", New Age International Publishers, New Delhi, 2000.

2. H.V.Srinivasmurthy, "Textile Fibers",Woodhead Publishers , New Delhi, 2017.

3. E P G Gohl; L D vilensky, "Textile Science", 2nd edition, Publisher-Melbourne: Longman Cheshire, 1983.

22TT805 ADVANCES IN KNITTING TECHNOLOGY

Hours Per Week :

L	T	P	C
2	2	0	3

PREREQUISITE KNOWLEDGE: Basics of knitting technology.

COURSE DESCRIPTION AND OBJECTIVES:

This course provides an overview on advanced circular and warp knitting machines. Also it discusses different areas of Apply knitted fabric. The objective of this course is to make the students to familiar with advanced knitting machines and industrial applications of knitted fabrics.

MODULE–1

UNIT-1   **8L+0T+0P=8 Hours**

ADVANCED KNITTING MACHINES :

Advances in circular knitting: Introduction, Hosiery knitting technology Current problems and limitations of circular knitted structures, Recent advances in circular knitting: Santoni seamless knitting technology, Ultra fine gauge knitting machine, Loop transfer technology in circular knitting machines, Pile and sliver insertion mechanism in circular knitting, Structure and properties of circular knitted fabrics. Intelligent yarn delivery systems in weft knitting.

UNIT-2   **8L+16T+0P=24 Hours**

Advances in warp knitted fabric production: Introduction, Commercial warp knit machines, Types of warp knit machine, Delaware stitch and modified Delaware stitch tricot fabrics, Tricot and Raschel containing spandex, Key Raschel fabrics containing spandex, newly developed constructions with spandex, Americana and modified Americana tricots.

Knitted Fabric Applications: Seamless knitted garments, Electro textiles, Automotive textiles, Orthopedic applications, smart garments.

PRACTICES:

- Studies on Surface interest fabrics.
- Milanese fabrics.
- Current problems and limitations.
- Knitting 3D structures using weft-knitting.
- Directionally oriented structures (DOS) and combined DOS weft-knitted.
- Weft-knitted multifunctional structures.
- Simulating mechanical properties of weft-knitted structures and Applications.

MODULE–2

UNIT- 1   **8L+0T+0P=8 Hours**

APPLICATIONS OF KNITTED FABRICS:

Knitted fabric composites: Introduction; Types of fibers and yarn used in knitted fabric Composites, Composite, Knit structures for fabric composites, Types of matrix materials, Developments in manufacturing methods for knitted fabric composites, Mechanical properties Applications.

Knitted structures for sound absorption: Introduction, Acoustic textiles in vehicles, Sound absorption of plain knitted structures, Engineering advanced knitted fabrics for sound absorption, Thick spacer structures, Dense spacer structures.

- ✓ *Construct different structures of knitted fabrics.*
- ✓ *Compare the properties of knitted fabrics.*
- ✓ *Prepare knitted fabric composites.*
- ✓ *Identify knitted fabrics in industrial applications.*

UNIT-2   **8L+16T+0P=24 Hours**

MOISTURE MANAGEMENT:

Weft-knitted structures for moisture management: Introduction, Basics of wetting, Wicking and absorption, Experimental liquid take-up, Future

PRACTICES:

- Case studies on advanced knitted products.
- Case studies on   Women's apparel.
- Case studies on   knitted underwear production.
- Case studies on   Functional requirements of knitted underwear.
- Performance evaluation of knitted underwear.
- Engineering of knitted underwear fabrics.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Understand various advanced knitting elements and machines.	Apply	1	1, 2, 4, 5, 9, 10, 12
2	Assessment of various knitted elastomeric fabrics.	Apply	1, 2	1, 2, 5, 9, 10
3	Design and developments to produce different knit structures based on their uses.	Analyse	1, 2	1, 2, 3, 5, 9, 10
4	Understand the different applications of knit fabric composites.	Analyse	2	1, 2, 5, 9, 10, 12

TEXT BOOKS:

1. K. F. AU, "Advances in Knitting Technology", Woodhead Publishing Limited, 1st edition, 2011.

REFERENCE BOOKS:

1. W. B. Azagoankar, "Knitting Technology", Mahajan Textile Publishers, 5th edition, 2006.
2. D. J. Spencer, "Knitting Technology", 2nd edition, Wood Head Publishing Company, England, 2008.

22TT806 TECHNOLOGY OF NON-WOVENS AND GEO TEXTILES

Hours Per Week :

L	T	P	C
2	2	-	3

PREREQUISITE KNOWLEDGE: Basics of non-woven and technical textile.

COURSE DESCRIPTION AND OBJECTIVES:

This course provides an overview on different types of nonwoven manufacturing techniques and geo textile applications. The objective of this course is to make the students to familiar with nonwoven fabric manufacturing processes using various machines and geo textile applications.

MODULE-1

UNIT-1   **8L+0T+0P= 08 Hours**

NONWOVEN FABRIC PRODUCTION:

Historical background of nonwovens, nonwoven definition, Classification of nonwoven – On the basis of use, on the basis of manufacturing process, on the basis of web formation, on the basis of bonding.

Dry laid webs, layering, Wet laid nonwoven – Raw materials, production process, special features of the wet laid process and its product. Spun laced webs.

Mechanically bonded webs – needle punched nonwovens, Application of needle punching, stitch bonded nonwovens. Hydro entangled nonwovens – Bonding process, water system, filtration system, web drying, properties of spun laced webs.

Thermally bonded nonwovens – binder, binding fiberss, binding powder, binding webs, methods of thermal bonding – Hot calendaring, belt calendaring, oven bonding, ultrasonic bonding, radiant heat bonding; Melt blown nonwovens.

Chemically bonded nonwoven – Latex binder, other types of nonwoven binders, formulation, order of formulation, bonding technology.

UNIT-2   **8L+16T+0P=24 Hours**

NONWOVEN FABRIC APPLICATION:

Application of nonwovens in apparel, agriculture, geotextiles, medical textiles, automotive textiles, filtration, home textiles, roofing and construction, and packaging.

PRACTICES:

● Preparation of fibers for improving surface area.
● Development of different types of wipes.
● Manufacturing of natural fiber nonwovens.
● Bonding of natural fiber nonwoven webs using chemical bonding method.
● Development of thermal bonded nonwovens.

MODULE-2

UNIT-1   **8L+0T+0P= 08 Hours**

GEO TEXTILE:

Geotextiles: The role of geotextiles; types of geotextiles: raw materials, woven, knitted & nonwoven geotextiles, polymer nets & grids, mats, strips, webs & ties, biodegradable geotextiles.

Filtration and erosion control applications: filtration principles, erosion control for inland waterways, coastal erosion protection, rainfall erosion control.
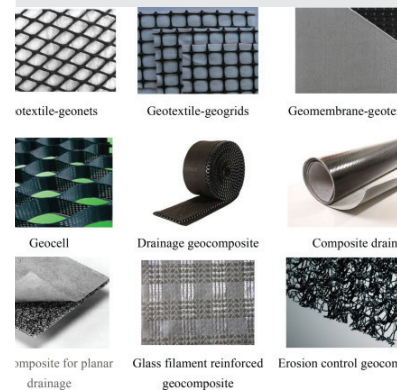
Geotextile-geonets, Geotextile-geogrids, Geomembrane-geote, Geocell, Drainage geocomposite, Composite drain, omposite for planar drainage, Glass filament reinforced geocomposite, Erosion control geocon

Source: https://ars.els-cdn. com/content/image/3-s2.0- B978012817048900007X -f07-05-9780128170489.jpg

Drainage applications: settlement acceleration, structural drainage, control of leachates, highway drainage.

Separation applications: unpaved roads, paved roads, railways, protection of geomembranes.

Soil reinforcement applications: geotextile properties, steep-faced embankments, soil nailing, slope stabilization, foundation mattresses, geotextile pile capping.

UNIT-2   **8L+16T+0P=24 Hours**

EVALUATION OF GEOTEXTILE:

Geotextile durability: Introduction to geotextile durability assessment, Geotextile degradation modes, Tensile creep and creep rupture, Installation damage, Abrasion of geotextiles.

PRACTICES:

Evaluation of geotextile materials :

- Tensile behavior (small-width & wide-width specimen)
- Seam strength
- Dynamic puncture behaviour
- Tear behaviour
- Compressibility
- Burst behaviour

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Understand the different applications of nonwovens; various raw materials required such as natural and manmade fibers and its impact on environment.	Apply	1	1, 2, 4, 5, 9, 10, 12
2	Analysis of different nonwoven fabrics and their processes.	Apply	1, 2	1, 2, 5, 9, 10
3	Investigate various parameters in different web bonding techniques andmethods to get desired quality.	Analyse	1, 2	1, 2, 3, 5, 9, 10
4	Understand the concepts and applications of geo textile materials.	Analyse	2	1, 2, 5, 9, 10, 12

TEXT BOOKS:

1   S. J. Russel, "Handbook of Nonwovens", 1st edition, Wood Head Publishing in Textiles, 2006.

2   R.M. Koerner, "Geotextiles - from Design to Applications", Woodhead Publishing Series in Textiles.

REFERENCE BOOKS:

1. Turbak, "Nonwoven Process Performance & Testing", 2nd edition, Tappi Press, Woodhead Publishing, Cambridge, 1993.

2. W. Albrecht, "Nonwoven Fabric Construction Synthetic Fiberss", JWS Publications, 2007.

3. https://www.edana.org/nw-related-industry/nonwovens-in-daily-life.

4. https://www.inda.org/about-nonwovens/nonwovens-glossary-of-terms/.

22TT807 MAINTENANCE OF TEXTILE MACHINERY

Hours Per Week :			
L	T	P	C
2	2	0	3

Source: https://i0.wp.com /textilelearner.net /wp-content/uploads /2021/08/weaving-machine-maintenance. jpg?fit=600%2C337&ssl=1

PREREQUISITE KNOWLEDGE: Basic knowledge of textile industries.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers maintenance of textile machineries. The objective of this course is to impart knowledge on maintenance of various machineries used in textile industry.

MODULE-1

UNIT-1   8L+0T+0P=8 Hours

INTRODUCTION TO MAINTENANCE:

Objectives of maintenance- types of Maintenance-Routine maintenance, Preventive maintenance, Predictive Maintenance, Planned, Emergency & Restorative maintenance - Organization of maintenance department in a textile mill - Duties & responsibilities of maintenance supervisor- Control of store planning, scheduling and controlling of maintenance- Work order procedure, inventory card system& Bin card system - work study - techniques, objectives – Time study – motion study.

UNIT-2   8L+16T+0P=24 Hours

MAINTENANCE OF SPINNING MACHINERIES:

Maintenance schedule of different spinning machineries – Schedule for blow room, carding, drawing, lap formers, comber, roving, ring frame, ring doubler and TFO - overhauling schedule of various spinning machineries - defects due to improper maintenance - maintenance schedule during strike & lay – off periods

Abrasives and Safety precautions in textile mills. Types of abrasives used in spinning mill – applications-cots – Buffing – Shore hardness treatments comber needling – needling for half lap- safety precautions in textile mills -maintenance of safety equipments.

PRACTICES:

- Maintenance instruments.
- ATIRA Roller tester.
- ATIRA NILO meter and
- ATIRA TARP Gauge-pneumafil suction pressure gauge.
- Tachometer.
- Stroboscope.

MODULE-2

UNIT-1   8L+0T+0P=8 Hours

MAINTENANCE OF WEAVING:

Maintenance schedule for Cleaning, Lubrication, Overhauling & Settings -maintenance schedule for Winding, Pirn winding, Warping, Sizing , Plain & automatic Looms - Care and maintenance of loom parts - Heald, Reed, Picker, Picking band , Shuttle, Buffer, Temples, box spindle and check strap - defects due to improper maintenance of preparatory machines and looms - List the causes of defects and rectification.

UNIT-2   **2L+14T+0P=16 Hours**

DYEING & PRINTING MACHINERIES:

Maintenance schedule of different Dyeing & printing machines, Up keep of Boilers and Kiers- maintenance schedule of Padding mangles, Stenter-maintenance schedule for Dyeing machines- maintenance schedule for printing machines-maintenance schedule for strikes and lay –off periods.

PRACTICES:

- Padding mangle working principle.
- Winch working principle.
- Jigger working principle.
- J box working principle.
- HTHP machine details.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Outline various maintenance operations in textile industry.	Apply	1	1, 2, 4, 5, 9, 10, 12
2	Choosing various types of maintenance instruments.	Apply	1, 2	1, 2, 3, 5, 9, 10
3	Realize different lubricants & bearings used in textile industry.	Analyse	1, 2	1, 2, 5, 9, 10
4	Clear idea about the various types of abrasives used in spinning mill and Safety precautions in textile mills.	Analyse	2	1, 2, 5, 9, 10, 12
5	Assessing maintenance schedule of different dyeing & printing machines.	Evaluate	1, 2	1, 2, 3, 4, 5, 9, 10, 12

TEXT BOOKS:

1. T V Rathinam -. Maintenance management in spinning – SITRA.
2. Maintenance of textile machineries (Spinning, Weaving & Processing) - Tairo Publications.
3. J.B.Joshi , K.B Vora - Spinning, Weaving & Processing machineries – Wood head publishing Ltd.

REFERENCE BOOKS:

1. ATIRA Process control in weaving – ATIRA.
2. A r Garde - Norms for mechanical processing – BITRA.
3. A T Shahani - Maintenance in ring frame – BITRA.
4. ATIRA Maintenance in chemical processing department – ATIRA.
5. Repair and adjustment of Textile machineries - M. R. Publications.

22TT808 RETAILING AND BRANDING OF APPAREL

Hours Per Week :

L	T	P	C
2	2	0	3

PREREQUISITE KNOWLEDGE: Basic knowledge on retails and brands of textiles.

COURSE DESCRIPTION AND OBJECTIVES:

To provide the fundamental knowledge of concepts of retailing. To provide knowledge on the customer relationship management. To develop the understanding of retail advertising andretail sales promotion. To provide the knowledge of international retailing and influence ofinformation technology on retailing. To educate the students about the branding and its concepts

MODULE-1

UNIT-1   **8L+0T+0P=8 Hours**

RETAILING:

Introduction to Retail, Functions of a retailer, Marketing-Retail equation, rise of the retailer, proximity to customer, rise of consumerism, global retail market, challenges and opportunities, empowered consumer-technology enabled effectiveness, FDI in retail, The Concept of life cycle in retail-innovation, accelerative growth, maturity-decline, phases of growth in retail markets, classification based on ownership, merchandise offered, franchising, non-store retailing, direct selling, direct response marketing, telemarketing, fairs and road shows, event management, automated vending, kiosks, cash & carry, credit marketing.

UNIT-2   **8L+16T+0P=24 Hours**

CUSTOMER RELATIONSHIP MANAGEMENT:

Scope, components, customer life cycle- B2B CRM, using customer touch, CRM planning & strategy development

PRACTICES:

- Case studies on Services management.
- Case studies on mall management.
- Case studies on visual merchandizing.
- Case studies on mannequin.
- Case studies on Signs and communication.

MODULE-2

UNIT- 1   **8L+0T+0P=8 Hours**

RETAIL ADVERTISING AND PROMOTION:

Advertising in retailing:Advertising principles-steps in planning a retail advertising, campaign, advertising for the retail store.

Retail promotional strategy:Promotional objectives, promotional budget, selecting the promotional mix, implementing the promotional mix.

Personal selling and publicity:Publicity and special events-role of personal selling in retailing process in personal selling.

Information technology in retail management:Influencing parameters for use of IT in retailing, IT

application for retail, issues concerning the use of internet and related technology to improve retail business, types on online retailing, effective management of online catalogues, direct retailing methods that involves technology such as interactive TV and mobile commerce, electronic data interchange, E-retailing strategies

UNIT- 2   **8L+16T+0P=24 Hours**

BRANDING:

Brand, Brand Development: Extension, rejuvenation, re launch-product Vs brands, goods and services, Retailer and distributors. Brand challenges and opportunities, brand equity concept, Identity and image. Brand Leveraging & Brand Performance- establishing a brand equity management system, measuring sources of brand equity and consumer mind-set, Co-branding, celebrity endorsement.

PRACTICES:

- Case studies on Brand positioning & brand building.
- Case studies on brand portfolios and market segmentation.
- Case studies on Steps of brand building.
- Case studies on Identifying and establishing brand positioning.
- Case studies on Brand hierarchy, branding strategy.
- Case studies on Brand Extension and brand transfer.
- Case studies on Managing brand over time.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Know the concept of retailing.	Apply	1	1, 2, 4, 5, 9, 10, 12
2	Factors influencing international retailing and the scope and role of information technology on retailing..	Apply	1	1, 2, 5, 9, 10, 12
3	Examine the role of Customer relationship management in retailing	Analyse	1, 2	1, 2, 5, 9, 10
4	Analyse the need and objectives of retail advertising and retail sales promotion..	Analyse	1, 2	1, 2, 3, 5, 9, 10

TEXTBOOKS:

1. J. Paul Peter and Jerry L.Olson, "Consumer Behaviour and marketing Strategy", Tata Mcgraw Hill,New york, 2006.
2. Swapna pradhan, "Retailing Management: Text and Cases", 2nd edition, Tata McGrawhill, New Delhi, 2006.

REFERENCEBOOKS:

1. Patrick M Dunne, Robert F. Lusch and David A. Grififth-Retailing, Thomson Asia Pvt. Ltd. 2002.
2. Gillespie, Hecht and Lebowitz, "Retail Business Management", 3rd edition, McGraw Hill Book Company, 2002.

22TT809 TOTAL QUALITY MANAGEMENT IN TEXTILE INDUSTRIES

Hours Per Week :

L	T	P	C
2	2	0	3

Source: https://static. fibers2fashion. com// articleresources/ images/36/3500/ an-overview- on-some-of-the- basics-of-tqm.jpg

PREREQUISITE KNOWLEDGE: Basic knowledge of quality management concepts.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers quality management concepts followed in textile industries. The objective of this course is to impart knowledge on various quality management concepts to improve the quality of textile material.

MODULE-1

UNIT-1   **8L+0T+0P=8 Hours**

INTRODUCTION TO TQM:

Introduction - Need for quality - evolution of quality - definitions of quality - dimensions of product and service quality - basic concepts of TQM - TQM Framework - contributions of deming, Juran and Crosby - barriers to TQM - Customer focus - customer orientation, customer satisfaction, customer complaints, customer retention.

TQM Principles

Leadership - Quality statements, strategic quality planning, quality Councils - employee involvement - motivation, empowerment, team and teamwork, recognition and reward, performance appraisal - continuous process improvement - PDCA cycle, 5S, kaizen - supplier partnership - partnering, supplier selection, supplier rating.

UNIT-2   **8L+16T+0P=24 Hours**

TQM TOOLS AND TECHNIQUES I:

The seven traditional tools of quality - new management tools - six sigma: concepts, methodology, applications to manufacturing, service sector including IT - bench marking - reason to bench mark, bench marking process - FMEA - Stages, Types.

PRACTICES:

- Case studies on implementing TQM in textile industries.
- Case studies on Barriers to implementing TQM in textile industries.
- Case studies on implementing PDCA cycle.
- Case studies on implementing 5S.
- Case studies on implementing Six sigma Concepts in Textile industries.

MODULE - 2

UNIT-1   **8L+0T+0P=8 Hours**

TQM TOOLS AND TECHNIQUES II.

Quality Circles - cost of quality - quality function deployment (QFD) - Taguchi quality loss function - TPM - concepts, improvement needs - performance measures.

Quality Management System-Introduction—Benefits of ISO Registration—ISO 9000 Series of Standards—Sector-Specific Standards—AS 9100, TS16949 and TL 9000-- ISO 9001 Requirements— Implementation— Documentation—Internal Audits—Registration.

UNIT-2   **8L+16T+0P=24 Hours**

ENVIRONMENTAL MANAGEMENT SYSTEM:

Environmental Management System: Introduction—ISO 14000 Series Standards—Concepts of ISO 14001—Requirements of ISO 14001—Benefits of EMS.

PRACTICES:

- Case studies on formation of Quality Circles in textile industries.
- Case studies on implementing ISO 9000 in textile industries.
- Case studies on Taguchi quality loss function in textile industries.
- Case studies on TPM in textile industries.
- Case studies on Performance measures in textile industries.
- Case studies on ISO 14000 Series.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Applying TQM concepts.	Apply	1	1, 2, 4, 5, 9, 10, 12
2	Executing TQM principles in industry.	Apply	1, 2	1, 2, 5, 9, 10
3	Appraising proper tool for industries.	Analyse	2	1, 2, 3, 5, 9, 10
4	Rating all environment management systems.	Evaluate	2	1, 2, 5, 9, 10, 12

TEXT BOOKS:

1. Dale H.Besterfiled, Carol B.Michna,Glen H. Besterfield,Mary B.Sacre,Hemant Urdhwareshe and Rashmi Urdhwareshe, "Total Quality Management", Pearson Education Asia, Revised Third Edition, Indian Reprint, Sixth Impression, 2013.

REFERENCE BOOKS:

1. James R. Evans and William M. Lindsay, "The Management and Control of Quality",   8thEdition, First Indian Edition, Cengage Learning, 2012.

2. Janakiraman. B and Gopal .R.K., "Total Quality Management - Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.

3. Suganthi.L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006.

22TT810 FASHION THEORY

Hours Per Week :

L	T	P	C
2	2	0	3

PRE-REQUISITE KNOWLEDGE: Basic knowledge of fashion trends

COURSE DESCRIPTION AND OBJECTIVES:

This course offers introduction to fashion, art and design, consists of basic definition of fashion, classification and its type, types of design, elements of designing, traditional textiles of India and role of garment accessories. The objective of this course is to provide insights in to fundamentals of fashion theory, designing and technological aspects of fashion.

MODULE - 1

UNIT-1   8L+0T+0P=8 Hours

INTRODUCTION TO FASHION DESIGN:

Definition of fashion design, Costume and clothing, Origin and history; Importance of clothing, factors to be considered in the selection of clothing; Evolution of dress from paintings, cuttings, sculpture and wood carvings. Classification and types of fashion; Factors effecting fashion, business of fashion, theories of fashion; Study of leading fashion designers; French, Italian, American, Indian and English.

definition of fashion designing : Concepts of design, types of design, elements of design,principle of designing, role of fashion designers.

UNIT-2   8L+16T+0P=24 Hours

COSTUMES OF ANCIENT CIVILIZATIONS:

Costumes of ancient civilizations: Traditional costumes of different states of India; Costumes of ancient civilizations, Egypt, Greek, Roman, English, French empires during Renaissance 1500 –1600 AD; Overview of costumes of Pakistan, Sri Lanka, Burma, China, Japan and Africa.

PRACTICES:

- Case studies on History of embroidered.
- Case studies on hand-woven, dyed, printed and painted textiles of India.
- Case studies on Floor coverings, carpets and durries.
- Case studies on Colored textiles, bandhani, patola, ikkat, pocchampalli.
- Case studies on Woven textiles brocades, jamavar, paithani, jamdani, chanderi, maheshwari, kanjivaram, kota, baluchari, dacca muslin, himrus and amrus.
- Case studies on Printed textiles.
- Case studies on Painted textiles; Kalamkari; Shawls of kashmir.

MODULE-2

UNIT-1   8L+0T+0P=8 Hours

GARMENT ACCESSORIES:

Introduction to fashion accessories, classification of various accessories; Selection of materials, design, functional and aesthetic performance and their advantages; Ribbons, Braids, Laces, Appliqués, Buttons, Zippers, Snap fasteners, Hooks and eyes, Hook and loop tape; Eyelets, Neck tie, Scarves, Stoles, Umbrella, Socks, Stockings, Veils.

Source: https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcRk_cGR1X3sdBFVFubnrXu1qcrb2IKj83M_gcnqohsPEwzwjMaj3EgrFBGOvH9xk_XlKhs&usqp=CAU

UNIT-2   **8L+16T+0P=24 Hours**

LEATHER ACCESSORIES:

Leather accessories: Selection of materials, design, functional and aesthetic performance and their advantages; Various styles of footwear, belts, gloves, hand bags, hats, wallets, and other personal leather goods; Concepts of pattern making techniques and the production process of these accessories.

PRACTICES:

- case studies on Selection of materials.
- case studies on aesthetic performance.
- case studies on various styles: Pendants, waist bands, wrist bands, necklaces, head bands, bows, sunglass, wrist watches, rings, ear rings, bangles, bracelets and anklets.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Apply theoretical aspects of fashion, design and technology with respect to various selection factors.	Apply	1	1, 2, 4, 5, 9, 10, 12
2	Review the evolution of clothing and interpretation of theories relating to fashion.	Apply	1, 2	1, 2, 5, 9, 10
3	Illustrate different clothing of Indian states and civilizations.	Analyse	1, 2	1, 2, 3, 5, 9, 10
4	Design and apply various fashion accessories for a specific garment style.	Analyse	2	1, 2, 5, 9, 10, 12

TEXT BOOKS:

1. G. Russel, B. Nicholas, "Traditional Indian Textiles", Thames and Hudson, London, 1991.
2. J. Peacock, "Fashion Accessories – The Complete 20th Century Source Book", Thames and Hudson Publication, 2000.

REFERENCES:

1. G.S Churye, "Indian Costume", Prakashan Pvt. Ltd., Bombay, 1995.
2. R. Bhargav, "Design Ideas and Accessories" Jain Publications Pvt. Ltd., 2005.
3. P. Tortora, "Encyclopedia of Fashion Accessories", Om Books Publication, 2003.
4. Elaine Stone, "Fashion Merchandising – An Introduction", 5th edition, McGraw-Hill, 1990.

22TT811 GARMENT PRODUCTION MACHINERY

L	T	P	C
2	2	0	3

Hours Per Week :

PREREQUISITE KNOWLEDGE: Basic knowledge of garment production.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers list of machineries used to produce good quality of garment. The objective of this course is to impart knowledge on various machineries used in garment production.

Source: https://media.
gettyimages.com/
photos/sewing-or-
tailoring-industrial-hall-
with-machinery-picture-
id1279917988?s=612x612

MODULE-1

UNIT-1   **8L+0T+0P=8 Hours**

SPREADING, MARKING AND CUTTING:

Types of Fabric Packages, one way, two way Fabrics, effect on spreading, methods of fabric spreading, spreadingequipments – Computerized spreaders – Marker making – Marker efficiency – Factors affecting marker efficiency – Marker duplicating methods – Computer aided marker planning. Introduction to cutting machines – Types and functions, Computerized cutting machines, maintenance, common defects in cutting and their remedies.

UNIT-2   **8L+16T+0P=24 Hours**

SEWING MACHINE:

Basic parts of sewing machine, Primary and auxiliary part and their functions. Bobbin case / Bobbin hook, Throat plate – Takeup devices – Tensioners- Feed dog – Pressure foot. Types of needles – Part of needles and their function. Needle finishes. Adjustments of Stand height – pedal – Needle Bar – Stitch length selection – Feed timing – Needle and Bobbin Thread Tension – Stitch cycle timing diagram. Common defects and remedies. Special attachments in sewing machines – guides, folders, stackers, trimmers, zippers

PRACTICES:

- Identify the Single-Needle Lock Stitch machine parts, study various setting points, perform threading, prepare stitch samples by using various folders and calculate the SPI for specified/ chosen stitch length.
- Identify the Double-Needle Lock Stitch machine parts, study various setting points, perform threading, prepare stitch sample and calculate the SPI for given stitch length.
- Identify an Over-lock machine parts, study various setting points, perform threading, prepare stitch sample and calculate the SPI for given stitch length.
- Study of the Over-lock machine adjustments for needle-thread, looper thread tension, feed-ratio, needle-and-looper setting and knife setting.
- Identify the Flat-lock machine parts, study various setting points, perform threading, prepare stitch sample and calculate the SPI for given stitch length.

MODULE-2

UNIT-1   **8L+0T+0P=8 Hours**

OVER LOCK AND FLAT LOCK MACHINES:

Over lock machines – Types of over lock machines, parts and their functions. Threading diagram for over lock machines. S titch Cycle Diagram for over lock machines – Adjustment of Needle height, Feed dog height, angle, Differential feed ratio, Position of upper and lower knives, loppers. Defects

and Remedies. Flat lock machines – Types,parts and their functions. Threading diagram of flat lock machines – Stitch cycle diagram. Adjustment of parts – Needle height, feed dog height, differential feed ratio, loppers. Maintenance of flat lock machines. Defects and Remedies. Introduction to different special purpose sewing machines.

UNIT-2   **8L+16T+0P=24 Hours**

EMBROIDERY AND OTHER MACHINERIES:

Basic working of Feed of Arm, Button hole sewing, button sewing, Bar tack, blind stitch machines. Embroidery sewing machines. Latest developments in sewing machines. Sewing machine maintenance –Maintenance schedule for various machines. Maintenance audit.

PRACTICES:

- Study of the Flat-lock machine for making adjustments of the needle-thread and looper-thread tension, feed-ratio, needle-and-looper setting and spreader setting.
- Identify the Button-sewing machine parts, study various setting points, perform threading and prepare stitch sample.
- Identify the Button-holing machine parts, study various setting points, perform threading and prepare stitch sample.
- Identify the Feed-off-the-arm machine parts, study various setting points, perform threading and prepare stitch sample.
- Identify the Bar-tack machine parts, study various settings points perform threading and prepare stitch sample.
- Identify various stitch defects, their causes and remedies and adjustments of machine settings for remedy.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Categorizing and applying Apply different kind of sewing machineries.	Apply	1	1, 2, 4, 5, 9, 10, 12
2	Confident with selecting type of sewing machine.	Apply	1, 2	1, 2, 5, 9, 10
3	Reviewing different classes of stitches.	Analyse	2	1, 2, 3, 5, 9, 10
4	Appraising quality of the garment embroidery.	Evaluate	2	1, 2, 5, 9, 10, 12

TEXT BOOKS:

1. R. Rathinamoorthy and R. Surjit ApparelMachinery and Equipments, 2015, Woodhead Publishing.
2. Rajkishore Nayak and Rajiv Padhye Garment Manufacturing Technology, 2015 Woodhead Publishing.

REFERENCE BOOKS:

1. Rajkishore Nayak and Rajiv Padhye Automation in Garment Manufacturing, 2017 Woodhead Publishing.
2. Harold Carr and Barbara Latham, "The Technology of Clothing Manufacture", Om Book Service, New Delhi, 1995.
3. Jacob Solinger, "Apparel Production Handbook", Van Nostrand Reinhold Publications, New York, 1998.
4. Cooklin Gerry, Introduction to Clothing Manufacture, Blackwell Science Ltd., Oxford, 2006.
5. Claire Shaeffer Ruth E. Glock and Grace I. Kunz, Apparel Manufacturing: Sewn Product Analysis, Fourth Edition, Pearson Education, New Delhi, 2005.

22TT812 COSTING OF TEXTILE AND APPAREL PRODUCTION

Hours Per Week :

L	T	P	C
2	2	0	**3**

PREREQUISITE KNOWLEDGE: Basic knowledge of textile costing.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers fundamental concepts of costing and its various types of costing used in apparel industry. It discusses about factors that determine the price of garment and its components, different types and functions of packing and labeling cost. Objective of this course is to impart knowledge on costing and documents connected to exports and international codes for products and services.

Stitching Cost for Different Apparel	
Types of Apparel	**Costing**
Round neck T-shirt	18.00 taka
Polo shirt	20.00 taka
Shorts	10.00 taka
Vests	5.00 taka
Briefs	4.00 taka

Source: https://i0.wp.com/textiletutorials.com/wp-content/uploads/2017/05/Cost-or-costing-in-textile-and-apparel-business-min.jpg?fit=600%2C319&ssl=-1jpg?fit=600%2C319&ssl=1jg?fit=600%2C319&ssl=1

MODULE-1

UNIT-1   **8L+0T+0P=08 Hours**

INTRODUCTION:

Introduction – Cost, principles of cost; Types of cost - Fixed cost, variable cost, semi variable cost, conversion cost, differential cost; Elements of cost, direct material cost, direct expenses, direct wages, Indirect materials, Indirect expenses, Indirect labor; Overheads - Production overhead, administrative overhead, selling overhead, distribution overhead.

UNIT-2   **8L+16T+0P=24 Hours**

FACTORS INFLUENCING THE COSTING PROCESS:

Factors influencing the costing process - Fabric cost, unit of measurement (UoM), fabric minimum order quantity (MOQ), order quantity.

PRACTICES:

- Yarn cost calculation; Process cost calculation (Weaving/ knitting).
- Loom production cost, calculation of weaving cost, pick cost.
- Pre-treatment, dyeing, printing and finishing cost calculations.
- Garment Screen printing types and costs.
- Woven and knitted fabric cost calculations.

MODULE-2

UNIT-1   **8L+0T+0P=08 Hours**

COST CALCULATION IN APPAREL PRODUCTION:

Cost calculation in apparel production departments: Cutting department costs; Sewing department costs; Cost per minute of a sewing line; Costing of materials labor; Overheads in making of garments; Embroidery cost, factors affecting cost of embroidery; Trimming and checking department cost; Packing department costs, poly bag consumption calculations, carton box; Calculation of shipping and forwarding cost.

Factors influencing the cost of shipment - Mode of shipment, volume or size of the order, type of assortment, destination country, government rules and regulations.

UNIT-2   **8L+16T+0P=24 Hours**

OVERALL APPAREL MANUFACTURING COST:

Calculation of overall apparel manufacturing cost - (Cut – Make – Trim/Pack and Shipping), sample cost sheet; Packing and labelling cost - Different types and functions; Note on sustainable packing trims; Uses

of brand and size label; Cost of technical trims and packing trims - Thread, button, zippers, interlining; Shipment cost; Cost calculation of ladies, men and children's wear; Woven and knitted; Simple problems.

PRACTICES:

Case studies on Terms of payment in exports

- Advance payment, letter of credit (L/C).
- documents against acceptance (DA).
- documents against payment (DAP).
- A note on L/C operation flow, types of L/C.
- Delivery terms used in general export business.
- Note on INCOTERMS, dollar planning, dollar hedging.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Costing components and their functions, Examining their role in costing and apparel production.	Apply	1	1, 2, 5, 9, 10
2	Assess costing for different materials, process and products.	Apply	1, 2	1, 2, 3, 5, 9, 10
3	Analyse the elements of costing and apparel production.	Analyse	1	1, 2, 4, 5, 9, 10, 12
4	Examines, evaluate costing for different Trims, CMT Costs.	Analyse	2	1, 2, 5, 9, 10, 12
5	Demonstrating the effect on cost by varying the payment terms, dollar hedging in various product.	Evaluate	1, 2	1, 2, 3, 4, 5, 9, 10, 12

TEXT BOOKS:

1. R. Rathinamoorthy and R. Surjit, "Apparel Merchandising", 1st edition, Woodhead Publishing India Pvt. Ltd, 2018.

REFERENCE BOOKS:

1. Richord D. Irwin Icn," Principles of cost Accounting: Managerial Applications" Revised by Gayle Rayburn1983.
2. Sultan Chand & sons "Management Accounting" New Delhi, 2nd edition 1998.
3. David J. Tyler., " Materials Management in Clothing Production ", Blackwell Scientific Publications.

22TT813 FASHION MARKETING AND VISUAL MERCHANDISING

Hours Per Week :

L	T	P	C
2	2	0	3

PREREQUISITE KNOWLEDGE: Basic knowledge on fashion and visual marketing.

COURSE DESCRIPTION AND OBJECTIVES:

This course provides the fundamental concepts of fashion business and marketing, merchandising, sourcing and visual merchandising. The course also gives input for analysing components of Fashion marketing, merchandising, sourcing and visual merchandising. The objective of this course is to inculcate the SKILLS:: and analyse the basic concepts involved in fashion marketing and visual merchandising.

Source: https://3.
bp.blogspot.com/-
4YzwqeiXjkI/Upy3Q5aLOYI/
AAAAAAAAACM/
IWdz1VgwxkQ/s1600/
visual+merchandising_image.
JPG

MODULE-1

UNIT-1   **8L+0T+0P=8 Hours**

INTRODUCTION TO FASHION BUSINESS:

International fashion business pattern, basic business concepts in Indian apparel export house, business operations in China and other south Asian countries. Business patterns for Indian apparel retail and home textiles. Understanding from conceptboard to finished product and its sequence.

Fashion Marketing: Defining marketing, marketing mix the objectives of marketing department, market research, different types of markets, marketing strategies with respect to a product/brand, Indian apparel houses international marketing strategies and domestic marketing strategies, marketing models, B to B marketing, B to C marketing, direct marketing, digital marketing.

UNIT-2   **8L+16T+0P=24 Hours**

MERCHANDISING AND SOURCING :

Merchandising and sourcing: Concepts of merchandising, concepts and apparel product lines, dimensions of product change, determination and development of product line and product range.

PRACTICES:

● Case studies on Creative and technical design in garments and accessories.
● Case studies on new product development and seasons of sale, costing.
● Case studies on supply chain and demand chain understanding, sourcing negotiations.
● Case studies on global co-ordination in sourcing.
● Case studies on materials management and quality in sourcing.
● Case studies on supplier partnership in sourcing.
● Case studies on JIT technology.

MODULE-2

UNIT-1   **8L+0T+0P=8 Hours**

VISUAL MERCHANDISING FUNDAMENTALS:

Visual merchandising: Definition and functions, History, understanding retail in India, Retail Store; Site and Design, Image Mix: Top Six Elements, Store Exteriors, Store Interiors Display Basics, Design Basics, Principles of Design, Colour Blocking, People Buy Colours, Signage, Understanding Materials;

The Purpose of Planning Fixtures, types of Fixtures, Circulation Plan and Types of Circulation Plans, Meaning and Purpose of a Planogram, Benefits of a Planogram, implementation and maintenance of a Planogram.

UNIT-2   **8L+16T+0P=24 Hours**

MERCHANDISE PRESENTATION:

Merchandise presentation: Principles of Merchandise Presentation; Categories in Merchandise Presentation; Dominance Factor in Merchandise Presentation; Cross Merchandising.

PRACTICES:

- Case studies on Window Display Meaning and Scope.
- Case studies on Window Display-Construction.
- Case studies on Styling, Display Calendar, Sales Tracking.
- Case studies on Handling the mannequin, props, lighting.
- Case studies on organising an in-store event, VM tool kit.
- Case studies on quality and process in visual merchandising.
- Case studies on Standard operating procedures.

COURSE OUTCOMES:

The students will be able to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Concepts of fashion marketing and visual merchandising.	Apply	1	1, 2, 4, 5, 9, 10, 12
2	Concept in fashion products and develop a fashion marketing plan for different styles.	Apply	1, 2	1, 2, 5, 9, 10
3	Design a visual merchandising concept for men's wear, women's wear and kids wear application.	Apply	1, 2	1, 2, 3, 5, 9, 10
4	Demonstrate the knowledge of fashion marketing and visual merchandising using case study examples.	Analyse	2	1, 2, 5, 9, 10, 12
5.	Characteristics of merchandise presentation.	Evaluate	1, 2	1, 2, 3, 4, 5, 9, 10, 12

TEXT BOOKS:

1. Elian stone, Jean A samples, "Fashion Merchandising", McGraw Hill Book Company, NewYork, 1985.
2. Philip Kotler, Kevin Lane Keller, Abraham Koshy, and MithileshwarJha , "Marketing Management A South Asian Perspective", Pearson Education, New Delhi, 2006.

REFERENCE BOOKS:

1. Shivaramu S., "Export Marketing – A Practical Guide to Exporters", Wheeler Publishing,Ohio,1996.
2. Warren. J. Keegan and Mark.C.Green , "Global Marketing", Pearson Prentice Hall, NewDelhi, 2005.
3. Grace I. Kunz , Ruth E. Glock, "Apparel Manufacturing: Sewn Product Analysis", 4th edition, Prentice Hall, 2004.
4. Pradhan Swapana, "Retailing Management", Tata McGraw Hill, 2009.
5. Swati Bhalla and Anurag S "Visual Merchandising", Tata McGraw Hill, 2010.

22TT814 STATISTICS IN TEXTILE INDUSTRIES

Hours Per Week :

L	T	P	C
2	2	0	3

PREREQUISITE KNOWLEDGE: Basic knowledge of statistics.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers applications of statistics in textile engineering. The objective of this course is to impart knowledge on various statistics application of onto textile.

MODULE-1

UNIT-1   **8L+0T+0P=08 Hours**

PROBABILITY DISTRIBUTION AND ESTIMATE:

Probability distribution and estimations- Applications of Binomial, Poisson, normal, t, exponential, chi-square, F and Weibull distributions in textile engineering; point estimates and interval estimations of the parameters of the distribution functions.

Hypothesis testing- Sampling distribution; significance tests applicable to textile parameters – normal test, t test, chi-square test and F-test; p-Values; selection of sample size and significance levels with relevance to textile applications; acceptance sampling.

UNIT-2   **8L+16T+0P=24 Hours**

ANOVA:

Analysis of Variance and Non-Parametric Tests Analysis of variance for different models; non-parametric tests - sign test, rank test, concordance test.

PRACTICES:

- Case studies on chi square test in textile industries.
- Case studies on F test in textile industries.
- Case studies on T test in textile industries.
- Case studies on Apply ANOVA in textile manufacturing.

MODULE –2

UNIT-1   **8L+0T+0P=08 Hours**

PROCESS CONTROL AND CAPABILITY ANALYSIS:

Process control and capability analysis - Control charts for variables and attributes - basis, development, interpretation, sensitizing rules, average run length; process capability analysis.

UNIT-2   **8L+16T+0P=24 Hours**

DESIGN AND ANALYSIS OF EXPERIMENTS:

Design and analysis of experiments - 2k full-factorial designs; composite designs; robust designs; development of regression models, regression coefficients; adequacy test; process optimizations..

PRACTICES:

- Case studies on applications Control charts for variables and attributes in textiles
- Case studies on Linear Programming Techniques in textile industries.

Source: https:// brandongaille.com/wp-content/uploads/2013/11/22-Textile-Industry-Statistics-and-Trends.jpg

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Categorizing different statistics applications	Apply	1	1, 2, 4, 5, 9, 10, 12
2	DoHypothesis test in textile materials	Apply	1, 2	1, 2, 5, 9, 10
3	Appraising different classes ANOVA methods	Analyse	2	1, 2, 3, 5, 9, 10
4	Reviewing all statistical tool in experiments	Evalu-ate	2	1, 2, 5, 9, 10, 12

TEXT BOOKS:

1. Montgomery D.C., "Introduction to Statistical Quality Control", John Wiley and Sons, Inc., Singapore, 2002, ISBN: 997151351X.

2. Leaf G.A.V., "Practical Statistics for the Textile Industry, Part I and II", The Textile Institute, Manchester, 1984, ISBN: 0900739517.

REFERENCE BOOKS:

1. Douglas C. Montgomery, "Design and analysis of experiments", John Wiley & Sons, Inc., Singapore, 2000, ISBN 9971 51 329 3.

2. Ronald D. Moen, Thomas W. Nolan, Lloyd P. Provost, "Quality improvement through planned experimentation', McGraw-Hill, 1998, ISBN 0-07-913781-4

22TT815 TEXTILE AND APPAREL EXIM MANAGEMENT

Hours Per Week :

L	T	P	C
2	2	0	3

PREREQUISITE KNOWLEDGE: Basic knowledge of export and import process.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers basics of export and import of textile goods. The objective of this course is to impart knowledge export and import procedures and opportunities of textile materials.

Source: https://
textilevaluechain.
in/wp-content/
uploads/2020/06/Expo.
jpg

MODULE-1

UNIT-1   8L+0T+0P=08 Hours

BUSINESS STRATEGIES IN TEXTILE:

International markets for yarns, woven fabrics; international market for cotton, silk, jute, wool and other fibers; export and import of textiles by India – current status, promotional activities.

International markets for carpets and home textiles – product types, market potential and statistics, India - current status and promotional activities, role of export promotional councils.

UNIT-2   8L+16T+0P=24 Hours

INTERNATIONAL MARKETS FOR TEXTILE:

International markets for woven piece goods, knitted garments, leather garments; statistics of international apparel market and trade; export incentives, role of AEPC, CII, FIEO, Textile Committee.

PRACTICES:

- Case studies on International markets for yarns, woven fabrics.
- Case studies on export and import of textiles by India – current status.
- Case studies on role of export promotional councils.
- Case studies on AEPC, CII.
- Case studies on FIEO, Textile Committee.

MODULE-2

UNIT-1   8L+0T+0P=08 Hours

MARKETING:

Marketing – strategies, global brand building; logistics & SCM; role of export finances & EXIM banking, ECGC, Indian council of arbitration, FERA; impact of foreign trade on Indian economy.

UNIT-2   8L+16T+0P=24 Hours

EXIM POLICY:

Exim policy - customs act, acts relating to export/import of textile and apparel; Indian customs formalities - export documentation for excisable goods, import documentation, clearance of import.

PRACTICES:

- Case studies on import export policies of India.
- Case studies on global brand building in textile industries.
- Case studies on EXIM banking for textile industries.

- Case studies on Indian customs formalities.
- Case studies on export documentation for textile goods.
- Case studies on import documentation for textile materials.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1.	Categorizing opportunities of textiles in international market.	Apply	1	1, 2, 4, 5, 9, 10, 12
2.	Articulate EXIM policy.	Apply	1, 2	1, 2, 5, 9, 10
3.	Distinguishing import and export market.	Analyse	2	1, 2, 3, 5, 9, 10
4.	Building new concepts in export and import.	Evaluate	2	1, 2, 5, 9, 10, 12

TEXT BOOKS:

1. Charles W.I. Hill and Arun Kumar Jain, "International Business", 6th edition, Tata Mc Graw Hill, 2009.

2. John D. Daniels and Lee H. Radebaugh, "International Business", Pearson Education Asia, New Delhi, 2000.

3. K. Aswathappa, "International Business", Tata Mc Graw Hill, 2008.

REFERENCE BOOKS:

1. Michael R. Czinkota, IlkkaA. Ronkainen and Michael H. Moffet, "International Business", Thomson, Bangalore, 2005.

2. Aravind V. Phatak, Rabi S. Bhagat and Roger J. Kashlak, "International Management", Tata Mc Graw Hill, 2006.

3. Oded Shenkar and Yaong Luo, "International Business", John Wiley Inc., Noida, 2004.

4. Datey V.S., "Taxmann's Indirect Taxes", Taxmann Publications, 2008.

5. Kapoor D.C., "Export Management", Vikas Publishing House Pvt. Ltd., 2009.

6. Govindan N.S., "Indirect Taxes Made Easy", C.Sitaram & Co. Pvt.

22TT816 DYES AND PIGMENTS

Hours Per Week :

L	T	P	C
2	2	0	3

PREREQUISITE KNOWLEDGE: Basic knowledge of dyeing process.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers chemical nature of dyes and pigments. The objective of this course is to impart knowledge on various application of dyes and pigments onto textile materials..

Source: https://3. imimg.com/data3/ JU/UI/MY-5130543/ pigment-and-dyes-500x500.jpg

MODULE-1

UNIT-1   **8L+0T+0P=08 Hours**

DYES AND PIGMENTS:

Introduction of Dyes: Introduction to synthetic dyes. Definition of dyes & pigments, Color index and its significance; Nomenclature of dyestuffs. Classification of dyes according to the application methods and chemical structure.

Pigments & Classifications: Classifications based on chemical structure. Factors governing absorption of light. Relationship between color & chemical constitution; Relationship between chemical structure & substantivety; Relationship between chemical structure & fastness properties.

UNIT-2   **8L+16T+0P=24 Hours**

ELEMENTS OF DYEING:

Elements of Dyeing: Concept of % shade, affinity and substantively of dyes, liquor ratio, pH, solubility, dissolution of dyes, exhausting agents, retarding agents, aggregates of dyes,equilibrium factor, time of dyeing, temp of dyeing, compatibility of dyes in combination shades, % exhaustion, % expression.

PRACTICES:

- Case studies on Nomenclature of dyestuffs.
- Impact of water hardness and pH in dyes.
- Factors affecting affinity of dyes.
- Levels of pH for various dyes.
- Studies on dyeing process parameters.

MODULE-2

UNIT-1   **8L+0T+0P=08 Hours**

CLASSES OF DYES:

Dyes: Classification, general dyeing methods and fastness properties of direct dyed, reactive dyes, vat dyes and Sulphur dyed good. Acid dye & Basic dye: Classifications and mechanism of dyeing of silk and wool. nylon with acid dye, fastness properties of acid dyed material. General method of dyeing of acrylics, nylon with basic dyes. Fastness properties of basic dyed goods.

UNIT-2   **8L+16T+0P=24 Hours**

OTHER CLASSES OF DYES:

Other Classes of Dyes: Disperse dye: General methods of Dyeing with disperse dye, Fastness properties of disperse dyed goods; Development of Chlorine based reactive dyes; Fluorine based reactive dyes; Concept of thermochromics dyes, Photo chromic dyes and its applications.

SKILLS:

✓ *Know the relationship between color & chemical constitution.*

✓ *Relationship between chemical structure & fastness properties.*

✓ *Aware of dyeing parameters for correct shade.*

PRACTICES:

- Studies on organic dyes.
- Studies on organic pigments.
- Studies on Colorants in Health Aspect.
- Studies on Cosmetic Colorants.
- Studies on Colorants with the Environment Aspect.
- Studies on Colorants in food processing industries.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Categorizing different classes of dyes and pigments.	Apply	1	1, 2, 4, 5, 9, 10, 12
2	Articulate the dyes based on the origin and its chemical nature.	Apply	1, 2	1, 2, 5, 9, 10
3	Appraising different classes of dyes used for various applications.	Analyse	2	1, 2, 3, 5, 9, 10
4	Reviewing synthetic dyes over conventional dyes.	Evaluate	2	1, 2, 5, 9, 10, 12

TEXT BOOKS:

1. Ahmet Gürses, Metin Açıkyıldız, Kübra Güneş "Dyes and Pigments" ISBN : 978-3-319-33890-3 Springer International Publishing AG Switzerland 2016.
2. C. V. Koushik, "Chemical Processing of Textiles", NCUTE Publications, 2003.
3. V. A. Shenai, "Chemistry of Dyes and Principles of Dyeing Vol- 1", Sevak Publications, 2004.
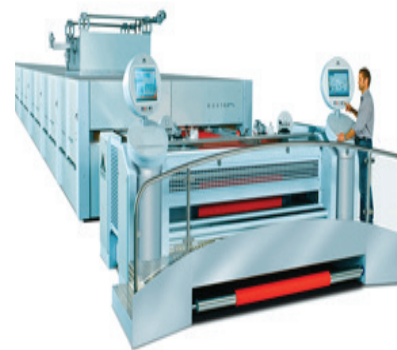
REFERENCE BOOKS:

1. E.R.Trotman, "Dyeing and Chemical Technology of Textile Fiberss", 3rd edition, Griffin Publications, SBT Bomboy, Ahmedabad, 1992.

22TT817 TECHNOLOGY OF DYEING AND PRINTING MACHINES

Hours Per Week :

L	T	P	C
2	2	0	3

PREREQUISITE KNOWLEDGE: Basic knowledge of textile fiberss.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers different working of dyeing and printing machineries. The objective of this course is to impart knowledge on various dyeing and printing machineries.

MODULE-1

UNIT-1   8L+0T+0P=08 Hours

FIBER & YARN DYEING MACHINES:

Preparation of cotton fabric for dyeing, principles of dyeing machine constructions, fiber dyeing machine, loose stock dyeing machine, yarn dyeing machine, hankyarn dyeing machine, package dyeing machine.

Fabric dyeing machines: Fabric dyeing machine; Jigger Dyeing machine, High temperature Jigger dyeing machine; winch dyeing machine: conventional winch, high temperature winch, high temperature winch with circulating liquor.

UNIT-2   8L+16T+0P=24 Hours

HTHP AND OTHER DYEING MACHINES:

Textile Dyeing Machines, Multi Nozzle Soft Flow Economical DyeingMachine, IR Beaker Dyeing Machine, HTHP Beaker Dyeing Machine, U Type Fabric Dyeing Machine, Industrial Basket, Arm Dyeing machine, electrochemical dyeing, use of ultrasonic in dyeing(sonicator).Dyeing of blends, problems and solutions. Single bath and two bath methods, reuse ofdye bath.

PRACTICES:

- HTHP Beam dyeing machine.
- Padding mangle.
- Jet dyeing machine.
- Soft overflow jet dyeing machine.
- Cold pad batch.
- Econtrol dyeing machine.
- Pad-steam and pad dry methods of dyeing.

MODULE-2

UNIT-1   8L+0T+0P=08 Hours

PRINTING MACHINES:

Preparation of cotton fabric for printing, Features, working, Faults causes, remedies and recent developments of Flatbed screen printing, Roller printing machine, Rotary screen printing, Inkjet / Digital printing.

UNIT-2   8L+16T+0P=24 Hours

FINISHING MACHINES:

Mechanical finishing- Raising, Calendering, Peach Finish Machine, Sanforising machine, Chemical finishing Stenter, Fabric softenign machines, padding mangles, Garment finishing mahcines,.Final inspection of processed fabrics.

SKILLS:

- ✓ *Differentiate the principles of dyeing.*
- ✓ *Identify suitable machines for fibers, yarn and fabric dyeing.*
- ✓ *Print the different fabrics with suitable style of printing.*
- ✓ *Optimize various machine parameters that influence dye and print quality.*

PRACTICES:

- Compacting machines.
- Micro sand finish.
- Decating machines.
- Crabbing machine.
- Denim finishing machines.
- Fabric foam finishing machines.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Develop various finished fabrics for different end use applications.	Apply	1, 2	1, 2, 3, 5, 9, 10
2	Investigate the various problem in the dyed fabric quality.	Analyse	2	1, 2, 5, 9, 10, 12
3	Assessing performance of machines.	Evalu-ate	1, 2	1, 2, 3, 4, 5, 9, 10, 12

TEXT BOOKS:

1. Asim Kumar Roy Choudhury "Principles of Textile Finishing" Elsevier Ltd, 2017.
2. C V Koushik, "Chemical Processing of Textiles", NCUTE Publications, 2003.

REFERENCE BOOKS:

1. A K Choudhury, "Textile Preparation and Dyeing", Science Publishers, 2006.
2. A J Hall, "Textile Bleaching, Dyeing, Printing and Finishing Machineries", Van Nostrand Company, Printed 1996.

22TT818 ADVANCES IN TEXTILE PRINTING AND FINISHES

Hours Per Week :

L	T	P	C
2	2	0	3

PREREQUISITE KNOWLEDGE : Basic knowledge of printing and finishes.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers advancements in printing and finishing of garment. The objective of this course is to impart knowledge on various machineries and methods of advanced printing and finishing.

MODULE-1

UNIT-1   **8L+0T+0P=08 Hours**

TRANSFER PRINTING AND INKJET PRINITNG:

Mechanism of sublimation transfer printing; selection of the paper; Printing methods; dyes and inks; Transfer prints on both man-made fiberss and natural fiberss; Machineries Ink jet printing: Principles of Ink jet printing technology: CIJ and DOD; pre-treatment of substrates; inks used for printing; dye- fibers interaction; post treatment of substrate; importance of digital colour management in inkjet printing.

UNIT-2   **8L+16T+0P=24 Hours**

FUNCTIONAL FINISHES I:

Wetting and wicking; surface energy – concept, measurement and relevance to repellency; water repellent, detergency and soil release concepts, soil release agents, mechanism of soil retention and soil release; application of water repellent, soil release finishes

PRACTICES:

- Comparison with conventional printing techniques.
- Assessment of water repellence of different fabrics.
- Assessment of soil release finish of different fabrics.

MODULE-2

UNIT-1   **8L+0T+0P=08 Hours**

FUNCTIONAL FINISHES II:

Flame retardant mechanisms, flame retarding chemicals for textile materials and testing of flame retardant finishes; UV radiation: Factors affecting UV protection, UV protection finishes, Measurement of UV protection.

UNIT-2   **8L+16T+0P=24 Hours**

FUNCTIONAL FINISHES III:

Antimicrobial finishes- classification, chemistry and application of antimicrobial finishes, evaluation of antimicrobial finishes.

PRACTICES:

- Antistatic finishes-Mechanism.
- Agents applied and its assessment.
- Anti-odour and fragrance finishes.
- Mosquito repellent finish.
- Application and assessment technique of finishes.

Source: https://i0.wp.com/textilelearner.net/wp-content/uploads/2022/01/Transfer-Printing.jpg?resize=600%2C371&ssl=1https://i0.wp.com/textilelearner.net/wp-content/uploads/2022/01/Transfer-Printing.jpg?resize=600%2C371&ssl=1

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Sublimation transfer printing.	Apply	1	1, 2, 4, 5, 9, 10, 12
2	Inkjet printing technology and its application.	Apply	1, 2	1, 2, 5, 9, 10
3	Water repellent and soil repellent finish.	Analyse	2	1, 2, 3, 5, 9, 10
4	UV Protection, flame retardant and antistatic finishes.	Evalu- ate	2	1, 2, 5, 9, 10, 12

TEXT BOOKS:

1. Miles L W C, "Textile Printing", Society of Dyers and Colourists, Hobbs the Printers, Hampshire, UK, 2003.
2. Shenai V A, "Technology of Printing", Sevak Publishers, Mumbai, 1990.
3. Shore J, "Colorants & Auxiliaries", Vol. I & II, Society of Dyers and Colourists, UK, 1990.

REFERENCE BOOKS:

1. Tyler D, "Textile Digital Printing Technologies", Textile Institute Publication UK, Vol.37 No.4, 2005.
2. jiie, "Digital Printing of Textiles", CRC, Wood Head Publishing Ltd, UK, 2006.
3. Schindler W D and Hauser P J, "Chemical Finishing of Textiles", The Textile Institute, Woodhead Publishing Ltd., Cambridge, 2004.
4. Charles T, "Chemistry & Technology of Fabric Preparation & Finishing", North Carolina State University, USA, 1992.
5. Perkins W S, "Textile Colouration and Finishing", Carolina Academic Press, UK, 1996.

22TT819 EFFLUENT TREATMENT AND POLLUTION CONTROL

Hours Per Week :

L	T	P	C
2	2	0	3

PREREQUISITE KNOWLEDGE: Basic knowledge of textile wet processing.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers constituent of water, effluent from textile processing units, purification and pollution. The objective of this course is to impart knowledge on various aspects effluent treatment and pollution control.

Image Source :
https://5.imimg.com/
data5/ANDROID/
Default/2021/5/SW/IG/
YH/23688669/product-
jpeg-250x250.jpg

MODULE-1

UNIT-1   **8L+0T+0P=08 Hours**

CONSTITUENTS OF WATER:

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

UNIT-2   **8L+16T+0P=24 Hours**

TREATMENT OF TEXTILE MATERIAL:

Characteristics and treatment of cotton, synthetics and wool processing effluents. Reduction of pollution load. Introduction; Textile Effluent treatment methods. Primary treatment methods; screening, sedimentation, equalisation, neutralisation, coagulation and flocculation. Secondary treatment methods.

PRACTICES:

- Secondary treatment methods.
- Trickling filtration.
- Activated sludge process.
- Aerated lagoons.
- Secondary sedimentation.
- Oxidation ponds.
- Anaerobic Digestion.
- Sludge disposal.
- Removal of interfering substances in secondary biological treatment.

MODULE-2

UNIT-1   **8L+0T+0P=08 Hours**

TERTIARY TREATMENT:

Evaporation (solar and steam). Membrane technologies (MF, UF, NF & RO), Reverse osmosis, ion exchange and activated carbon treatment. Model schematic diagram for Wastewater treatment plant for textile mills; Primary and Secondary units & Tertiary treatments, Quality parameters at entry and exit of RO. Chlorine trioxide treatment, ozone treatments, enzymatic decolourisation.

UNIT-2   **8L+16T+0P=24 Hours**

AIR POLLUTION:

Gaseous and Aerosols; Effects of air pollution; Effect of Sulphur oxide on human health; Properties of air pollutants; control of air pollutants; Air pollution control equipment.

PRACTICES:

- Ambient air quality standards.
- Emission limits at chimney level.
- Noise pollution – Types of noise (Steady state noise Impulse noise).
- ill effects of noise.
- Noise measurement.
- Control of noise pollution.
- Shape noise levels in decibels.
- Industrial visit to Textile Effluent treatment plant.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Know the textile processing related causes for pollution.	Apply	1	1, 2, 4, 5, 9, 10, 12
2	Effluent discharge standards and different processes involved in waste water treatment.	Apply	1, 2	1, 2, 5, 9, 10
3	Perform the research and development to produce zero discharge effluents.	Analyse	2	1, 2, 3, 5, 9, 10
4	Appraising quality of treatment plant and level of pollution.	Evaluate	2	1, 2, 5, 9, 10, 12

TEXT BOOKS:

1. Rao,C.S., "Environment pollution control engineering", New age International Ltd. and Publishers, N.Delhi, 2004.
2. Reife, A., and Freeman, H.S., (Ed)., "Environmental chemistry of dyes and pigment", Wiley., London, 2000, ISBN: 047158276.

REFERENCE BOOKS:

1. Horrockks, A.R (Ed)., "Ecotextiles'98: Sustainable development", The Text.Inst., Manchester 1999, ISBN: 1855732426.
2. Modak.P., "The textile industry and the environment", UNEP:HMSO, Blackwells, Leeds, 2003, ISBN: 9280713671.

22TT820 ECO-FRIENDLY WET PROCESSING

Hours Per Week :

L	T	P	C
2	2	0	3

PREREQUISITE KNOWLEDGE: Basic knowledge of textile chemical processing.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers importance of ecofriendly processing of textile goods, various developments in the field of textile wet processing with special emphasis on ecofriendly dyeing and finishing. Objective of this course is to impart fundamental concepts of ecofriendly grey fabric preparation, dyeing and finishing.

MODULE-1

UNIT-1   **8L+0T+0P=08 Hours**

APPLICATIONS OF BIOTECHNOLOGY:

Use of Biotechnology in Pretreatments: Significance and different applications in textiles, combined bio-scouring and bleaching of cotton, enzymatic degumming, enzymatic bleaching, brief note on nano-biotechnology.

Process Modifications in Pretreatments: Developments in singeing, desizing, bleaching and its eco-aspects, eco-friendly per acetic acid bleaching process and retting of jute. Concept of eco-friendly stabilizers for H_2O_2 bleaching, combined operations like desizing, scouring, bleaching, solvent scouring and ammonia treatment.

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UNIT-2   **8L+16T+0P=24 Hours**

ADAVANCED DYEING PROCESSES:

Developments in Dyes and Dyeing Techniques: Eco-friendly dyeing with sulphur & vat dyes. Brief note on developments in reactive dyes, low salt reactive dyes, multi-functional dyes, neutral fixing and acid fixing reactive dyes, super critical CO_2 dyeing.

PRACTICES:
- Determination of water hardness and pH.
- Different enzyme desizing methods and its evaluation method.
- Different enzyme scouring methods and its evaluation method.
- Different enzyme bleaching methods and its evaluation method.
- Eco-friendly Sulphur dyeing process.

MODULE-2

UNIT-1   **8L+0T+0P=8 Hours**

DEVELOPMENT IN FINISHING:

Development in Finishing: Low liquor and minimum liquor techniques in textile finishing, merits and demerits; Concept of wrinkle free finishing and eco-friendly resin finishes. Brief note on UV- protection finish, Anti-microbial, Flame Retardant, Self-Cleaning Textiles. The use of enzymatic techniques in the finishing of technical textiles.

UNIT-2   **8L+16T+0P=24 Hours**

NANOTECHNOLOGY APPLICATIONS:

Application of Nanotechnology in Textiles: Introduction of Nano finishing. Application of Plasma in Textiles: Concept, types and generation of plasma, different plasma treatment of textile; plasma modification of wool and cellulosic fibers.

PRACTICES:

- Case studies on government norms for various effluent.
- Studies on different eco-friendly resin finishing process.
- Evaluation of crease recovery angle from resin finished fabric.
- Different bio-polish treatment for cotton fabric.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Outlining eco-friendly textile processing .	Apply	1	1, 2, 4, 5, 9, 10, 12
2	Comparing conventional and new technology for ecofriendly processing.	Apply	1, 2	1, 2, 5, 9, 10
3	Choosing optimal chemical process for not affect the eco system.	Apply	1, 2	1, 2, 3, 5, 9, 10
4	Estimating characteristics of ecofriendly process-ing	Analyse	2	1, 2, 5, 9, 10, 12

TEXT BOOKS:

1. R M Christie, "Environmental Aspects of Textile Dyeing", Woodhead Publishing Limited, 2011.
2. S R Eklahare, "Eco friendly chemical processing of textiles and environment management", Green engineering company, 2001.

REFERENCE BOOKS:

1. Blackburn, "Biodegradable and Sustainable Fiberss", Woodhead Publishing Limited, 2005.
2. K.L. Mittal and Thomas Bahners, "Textile Finishing Recent Developments and Future Trends", 1st edition, Scrivener Publishing, 2017.

22TT821 SUSTAINABLE PRACTICES IN TEXTILE INDUSTRY

Hours Per Week :

L	T	P	C
2	2	0	3

Source : https:// www.sutlejtextiles. com/blogs/images/ blogs/W420-H270- textile.jpg

PREREQUISITE KNOWLEDGE: Basic knowledge of sustainability.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers sustainability of textile materials. The objective of this course is to impart knowledge on sustainability of textile and sustainable products..

MODULE-1

UNIT-1   **8L+0T+0P=08 Hours**

INTRODUCTION TO SUSTAINABILITY:

Introduction to sustainability: Sustainability; Concepts and terminologies in sustainable approach; principles of sustainability; importance and application of sustainable approaches in textile industry.

Sustainability in textile industry: Supply chain in textile industry; sustainable cotton, wool, and synthetic fibers production and processing.

UNIT-2   **8L+16T+0P=24 Hours**

SUSTAINABLE PROCESSING:

Sustainability in processing: Enzyme biotechnology, plasma technology in textiles; waterless dyeing technologies, low liquor dyeing.

PRACTICES:

- Case studies on Sustainability in spinning process.
- Case studies on Sustainability in weaving process.
- Case studies on Sustainability in garmenting process.
- Case studies on supply chain system in textile field.
- Case studies on various enzyme treatments.

MODULE–2

UNIT-1   **8L+0T+0P=08 Hours**

RECYCLING PROCESS:

Recycling of textiles: Introduction, recycling of polymer, fibers, yarn and fabrics; consumer perception of recycled textile products.

UNIT-2   **8L+16T+0P=24 Hours**

ECO DESIGNING AND ECO-LABELLING:

Eco designing and eco-labelling: Eco-design, building eco-design through supply chain; sustainability for credit rating; environmental management systems; standards for labelling, textile labels and environmental labelling; life cycle analysis of textiles.

SKILLS:

✓ *Know sustainability.*

✓ *Handling Enzymes.*

✓ *Aware of recycling of polymer.*

PRACTICES:

- Case studies recycling of synthetic yarns.
- Case studies recycling of synthetic fiberss.
- Case studies recycling of synthetic fabrics.
- Case studies recycling of dyed fabrics.
- Case studies eco-labelling.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Summarize sustainable products in textile.	Apply	1	1, 2, 4, 5, 9, 10, 12
2	Integrating sustainable textile materials.	Apply	1, 2	1, 2, 5, 9, 10
3	Appraising different classes sustainable materials.	Analyse	1, 2	1, 2, 3, 5, 9, 10
4	Reviewing sustainable materials into Eco designing.	Evaluate	2	1, 2, 5, 9, 10, 12

TEXT BOOKS:

1. Peter P Rogers., "An Introduction to Sustainable Development", Glen Educational Foundation, Inc, 2008, ISBN 978-1-84407-520-1.
2. Blackburn R S., "Sustainable Textiles", Woodhead Publishing Limited, 2009, ISBN 978-1-84569-453-1.

REFERENCES:

1. Marim I. Tobler. Rohr., "Handbook of Sustainable Textile Production", Woodhead Publishing Limited, Cambridge, 2011, ISBN 0-85274-426-9.
2. Miraftab M and Horrocks R, "Eco-Textiles", Woodhead Publishing Limited, Cambridge, 2007, ISBN 978-1-42004-444-7.
3. Youjiang Wang, "Recycling in Textiles", Woodhead Publishing Limited, Cambridge, 2006, ISBN 1-85573-952-6.
4. Chavan R B and Radhakrishnan J, "Environmental Issues - Technology Options for Textile Industry", IIT Delhi Publication, 1998.
5. Cavaco-Paulo and Gübitz G M, "Textile Processing with Enzymes", Woodhead Publishing Ltd., UK, 2003, ISBN 978-1-85573-610-8.
6. Manivasakam N, "Treatment of Textile Processing Effluents", Chemical Publishing Company, U.S.A, 2013, ISBN 978-0-82060-175-5.

22TT822 HIGH PERFORMANCE FIBERS

Hours Per Week :

L	T	P	C
2	2	0	3

PREREQUISITE KNOWLEDGE: Basic knowledge of textile fiberss.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers advancements of fibers in high end applications. The objective of this course is to impart knowledge on various fibers used in special entitlements.

MODULE-1

UNIT-1   **8L+0T+0P=08 Hours**

LINEAR POLYMER FIBERSS:

Polymer preparation, manufacturing methods, structure and properties of Aramid fiberss, polyethylene, Carbon Fiber, Glass fibers.

UNIT-2   **8L+16T+0P=24 Hours**

CERAMIC FIBERSS:

Manufacturing methods, structure and properties of ceramic fibres, silicon carbide-based fibres, other non-oxide fibres, alumina-based fibres, other polycrystalline oxide fibres, single-crystal oxide fibres.

PRACTICES:

- Case studies on standards and applications of Aramid fibres.
- Case studies on standards and applications of polyethylene fibres.
- Case studies on standards and applications of Carbon fibre.
- Case studies on standards and applications of Glass fibres.
- Case studies on standards and applications of ceramic fibres.
- Studies of shear thickening material.
- Structural requirement of bullet proof material

MODULE-2

UNIT-1   **8L+0T+0P=08Hours**

CHEMICAL AND THERMAL RESISTANT FIBERSS:

Chlorinated fibres, fluorinated fibres, polyetherketones, polyphenylenesulphide, polyetherimide - properties and applications; thermo plastic and thermoset polymers, aromatic polyamides and polyaramids, semi carbon fibres, polybenzimidazole.

Speciality Fibres

Specialty fibers - hollow and profile fibers; blended and bi-component fibers; super absorbent fibers.

UNIT-2   **8L+16T+0P=24 Hours**

THERMAL PROPERTIES OF FIBERSS:

Effect of fabric thickness on thermal resistance, Effect of thermal conductivity on various fabric and manufacturing technique.

PRACTICES:

- Studies on special synthetic fiberss for different thermal insulation applications.
- Studies on effect of coating on thermal behaviour.
- Studies on application of tog meter.
- Calculation of thermal resistance.
- Calculation of specific thermal resistance of textile fabric.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Outlining the origin of high performance fiberss.	Apply	1	1, 2, 4, 5, 9, 10, 12
2	Choosing optimal fibers based on application.	Apply	1, 2	1, 2, 3, 5, 9, 10
3	Comparing the physical structure of Linear polymer fiberss.	Analyse	1	1, 2, 5, 9, 10
4	Estimating properties of fiberss.	Analyse	2	1, 2, 5, 9, 10, 12
5	Assessing performance of speciality fiberss.	Evaluate	1, 2	1, 2, 3, 4, 5, 9, 10, 12

TEXT BOOKS:

1. Kothari V.K., "Textile Fiberss : Development and Innovations", Progress in Textiles,Vol.2,IAFL Publications,2000.
2. John W. S. Hearle., "High Performance Fiberss", Wood head Publishing Ltd., Cambridge, England, 2001, ISBN: 084931304X | ISBN-13:9780849313042.

REFERENCE BOOKS:

1. Peebles L.H., "Carbon Fiberss", CRC Press, London,1995.
2. Hongu T., and Phillips G.O., "New Fiberss", 2nd Edition, Wood head Publishing Ltd., England, 1997, ISBN: 185573334X / ISBN:978-1855733343.

22TT823 FUNDAMENTALS OF TEXTILE 4.0

Hours Per Week :

L	T	P	C
2	2	0	3

PREREQUISITE KNOWLEDGE: Basic knowledge of textile.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers advancements of textile manufacturing. The objective of this course is to impart knowledge on various advanced techniques used in textile industries.

MODULE-1

UNIT-1   **8L+0T+0P=08 Hours**

COMPUTER AIDED DESIGN:

 Introduction of textile design need and advantages of CAD; Hardware components of CAD system; Developments of Dobby / Jacquard design using different available software packages; Marker making systems; PDS –Pattern Design Software, Body measurement software; Texture mapping: Application of CAM in various areas of textiles; Computer aided knitting and embroidery.

UNIT-2   **8L+16T+0P=24 Hours**

INTERNET OF THINGS:

Layers, protocols, packets, services, performance parameters of a packet network as well as applications such as web, Peer-to-peer, sensor networks, and multimedia; IOT components and devices, overview of IOT, applications, potential & challenges, and architecture; IOT examples: Case studies, e.g. sensor body-area-network and control of a smart home and textile applications.

PRACTICES:

- SENSORS: Introduction to sensors and transducers.
- Displacement and position proximity sensors.
- Velocity and force sensors.
- Fluid presence temperature.
- Liquid level and light sensors.
- Selection of sensors.
- Actuators: Pneumatic and hydraulic systems.
- Mechanical actuation system.
- Electrical actuation system.
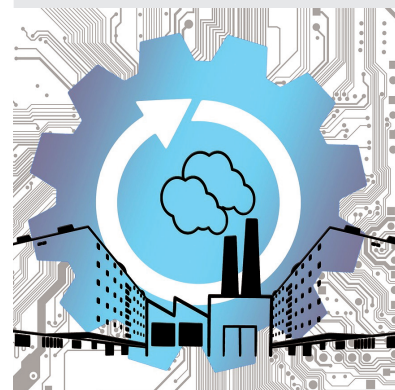- Applications of sensors in textiles.

MODULE-2

UNIT-1   **8L+0T+0P=08 Hours**

ARTIFICIAL INTELLIGENCE AND ALGORITHMS:

Definition, basic concepts of artificial Intelligence, scope, role and potential of artificial intelligence in manufacturing, Expert systems, Popular AI application; Overview of expert systems, architecture, comparison with procedural programming, developing expert system for typical manufacturing domains, implementation and maintenance, state- of- art expert system application, case study.

cyber physical systems: The next generation of embedded systems and networks, IT and OT convergence, co-creation and collaboration enablement; Smart cloud, hyper scale computing; Application delivery platforms and platform as a service; Intelligent analytics services.

UNIT-2   **8L+16T+0P=24 Hours**

SMART MANUFACTURING:

Smart manufacturing: Design and applicaitons; Introduction, smart manufacturing system in textiles, working principle, design and applications of smart manufacturing system.

PRACTICES:

- Cloud computing: Introduction to cloud computing: Definition of cloud, evolution of cloud computing.
- Underlying principles of parallel and distributed computing.
- Cloud characteristics; Elasticity in cloud, on-demand provisioning.
- Layered cloud architecture design.
- NIST cloud computing reference architecture.
- Public, private and hybrid clouds, IaaS, PaaS, SaaS.
- Architectural design challenges; Cloud storage; Storage-as-a-service.
- Advantages of cloud storage.
- Cloud storage providers.
- Applications of cloud storage in textile companies.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Define the components and their functions of Internet of Things and its algorithms, processes and its usage for textile applications.	Apply	1	1, 2, 4, 5, 9, 10, 12
2	Analyse, evaluate and apply the usage of sensors, algorithms of artificial intelligence, cloud computing and cyber physical system for Textile applications.	Apply	1, 2	1, 2, 3, 5, 9, 10
3	Identify and Analyse the design and algorithms used in textile design.	Analyse	1	1, 2, 4, 5, 9, 10, 12
4	Undertake a methodical approach to implement IOT, artificial intelligence and other related algorithms to textile application.	Analyse	2	1, 2, 5, 9, 10, 12
5	Carry out case studies related to Design and analysis of algorithms used in Textile application.	Evaluate	1, 2	1, 2, 3, 4, 5, 9, 10, 12

TEXT BOOKS:

1. Vijay Madisetti, Arshdeep Bahga, "Internet of Things: A Hands-On Approach". 1995.
2. Rittinghouse, John W., and James F. Ransome, ¯Cloud Computing: Implementation, Management and Security, CRC Press, 2017.

REFERENCE BOOKS:

1. Computer Technology for Textiles and Apparels, Jinlian Hu, published by Wood head publishing, 2011.
2. Automation in Textile Machinery: Instrumentation and Control System Design Principles, L.Ashok Kumar, M Senthil Kumar, Published by CRC press, 2018.
3. CAD/CAM in Clothing and Textiles,Gray, published by Gower Publishing Ltd,1998.
4. IOT (Internet of Things) Programming: A Simple and Fast Way of Learning IOT,Etter, Kindle edition, 2016.
5. Cloud Computing Black Book,JagannathKallakurchi, Donald J. Houde, Dr. Deven Shah, Kogent Learning Solutions KailashJayaswal, published by Dreamtech Press, 2014.

22TT824 TEXTILE REINFORCED COMPOSITES

Hours Per Week :

L	T	P	C
2	2	0	3

PREREQUISITE KNOWLEDGE: Basic knowledge of composites.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers textile reinforced composites. The objective of this course is to impart knowledge on various aspects preparing textile reinforced composites.

MODULE-1

UNIT-1   **8L+0T+0P=08 Hours**

COMPOSITES REINFORCEMENT:

Composites: introduction, definition; classification based on reinforcement and matrix; constituents. Matrix: thermoplastic and thermosetting matrices; properties; limitations; comparison; applications. Reinforcement Types:MMC, CMC, PMC; properties – limitations applications. Textile Reinforcement Forms; fibers, roving, fabric, mat, braid, etc.

UNIT-2   **8L+16T+0P=24 Hours**

COMPOSITES MANUFACTURING TECHNOLOGIES

Lay-up & Automatic lay-up: working principle – advantages – limitations – applications. Resin Transfer Moulding: principle of operation – resin system & injection – mold materials - resin flow strategies - advantages – limitations – applications. Filament winding: principle of working – geometry of winding – types of winding – mandrels - advantages – limitations – applications. Pultrusion: process equipments - principle of operation – pull forming - advantages – limitations – applications. Consolidation techniques: Vacuum bagging – Pressure bagging.

PRACTICES:

High performance fiberss:

- Applications and properties of aramid.
- Applications and properties of glass.
- Applications and properties of boron.
- Applications and properties of carbon.
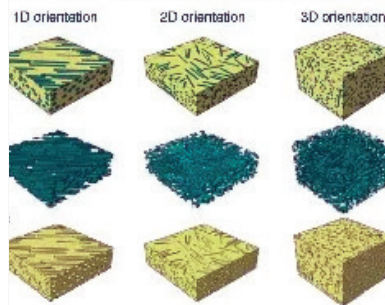- Testing of Reinforcement and Matrices.

MODULE-2

UNIT-1   **8L+0T+0P=08 Hours**

DESIGN OF STRUCTURE WITH COMPOSITES:

Interface: definition – conditions for good interfacial reactions - interface mechanisms - surface treatments. Design of Composites: material selection - configuration selection – design requirements – design load definitions – optimization concepts - laminate design.

Composition of **composites**

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UNIT-2   **8L+16T+0P=24 Hours**

MECHANICS AND TESTING OF COMPOSITES:

Geometric and Physical definitions. Lamina and Laminate: definition - angle of orientation mass density and ply thickness, fibers volume fraction (FVF) - critical fibers length - rule of mixture. Fibers Composites: strength and failure – fracture toughness – fatigue – impact – delamination – moisture expansion – conductivity – damage and failure modes. Testing of Composites: Destructive testing: tensile - compression – bending - shear – impact – ignition loss & matrix digestion – accelerated weathering test.

PRACTICES:

Applications of Composites

● Land Transport Applications: Automotive applications; rail road applications; mass transit applications ; military applications.

● Marine Applications: boats,large power yachts, sail boats, pressure hulls, sonar domes, fairings, control surfaces, decking pipes.

● Industrial Applications: antennas, bridges, cable cars, electrical and electronics.

● Composite Biomaterials: orthopaedic implants, femoral components for total hip arthroplasty, bone cement, articulation components.

● Construction applications: rebars – prestressing – rehabilitation – platforms – pedestrian bridges – cooling towers. Other applications: aircrafts, sports goods and aerospace.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Select different types of textile reinforcements.	Apply	1	1, 2, 4, 5, 9, 10, 12
2	Matrices for the manufacture of composites for getting different characteristics.	Apply	1, 2	1, 2, 5, 9, 10
3	Assess the characteristics of composites.	Analyse	2	1, 2, 3, 5, 9, 10
4	Appraising quality of treatment plant and level of pollution.	Evalu-ate	2	1, 2, 5, 9, 10, 12

TEXT BOOKS:

1. S.T. Peters, Chapman & Hall, "Hand Book of Composites", Second Edition, ISBN 0 412 54020 7, 1998.

2. Robert M.Jones, Taylor & Francis, "Mechanics of Composite Materials", Second Edition, 1999.

REFERENCE BOOKS:

1. Güneri Akovali, "Hand book of Composite Fabrication" Rapra technology Ltd., UK, ISBN: 1-85957-263-4, 2001.

2. Isaac M.Daniel, Ori Ishai, "Engineering mechanics of Composite Materials", Oxford University Press, UK, 1994.

3. A. Brent Strong, "Fundamentals of Composites Manufacturing" Society of Manufacturing Engineers, 2008.

4. Mel M. Schwartz, "Composite materials handbook" McGraw-Hill, 1992. 5. Stuart M. Lee, "International encyclopedia of composites" VCH, 1999.

22TT825 MEDICAL TEXTILES

Hours Per Week :

L	T	P	C
2	2	0	3

PREREQUISITE KNOWLEDGE: Basics of textiles.

COURSE DESCRIPTION AND OBJECTIVES:

The main goal of the course is getting awareness on Different types of materials used for biomedical applications. Functional requirements, types and evaluation of wound dressings and bandages, Functional requirements and characterization of vascular grafts, sutures and scaffolds for tissue engineering applications Textile material used for hygiene and health care applications, Standards for testing, safety and ethical issues related to medical textiles

MODULE-1

UNIT-1   **8L+0T+0P= 08 Hours**

MEDICAL TEXTILES AND BIOPOLYMERS, TESTING AND TISSUE ENGINEERING:

classification, current market scenario in international and national level – government initiatives; antimicrobial agents for textile substrates and finishes; nano fibrous materials and films; super absorbent polymers; operating room garments; personal health care and hygiene products and their testing methods; applications of non-wovens in medicine; textiles in infection prevention control.

UNIT-2   **8L+16T+0P=24 Hours**

IMPLANTABLES, NON-IMPLANTABLES AND DRUG DELIVERY:

Biopolymers: classification and their properties, requirements, and applications, testing methods; In vitro tests – direct contact, agar diffusion & elution methods – in vivo assessment of tissue compatibility. Tissue engineering: properties and materials of scaffolds- relationship between textile architecture and cell behavior – applications of textile scaffolds in tissue engineering.

PRACTICES:

- Bandages-types, properties and applications.
- Compression garments-types, properties and applications.
- Sutures: types and properties.
- Implantable textiles: hernia mesh– vascular prostheses – stents.
- Extra corporeal materials: Cartilage nerves – liver ligaments, kidney, tendons, cornea.
- Drug delivery textiles: classification – mechanism various fabrication methods – characterization – applications.

MODULE-2

UNIT-1   **8L+0T+0P=08 Hours**

WOUND CARE AND REUSABLE MEDICAL TEXTILES:

Wound: types and healing mechanism- textile materials for wound dressing – bio active dressing – anti microbial textiles dressing – composite dressing –- testing of wound care materials; Wound compression textiles; Reusable medical textiles: types, advantages, physical properties and performance —- reusable processing methods.

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img,w_440,h_380/
https://www.textileblog.
com/wp-content/
uploads/2020/03/
Medical-textile-
products.jpg

UNIT-2   **8L+16T+0P=24 Hours**

SMART MEDICAL TEXTILES AND LEGAL ISSUES:

Smart textiles- types, characteristics; smart textiles in wound care; applications of phase change and shape memory materials; monitoring pregnancy, children and cardio patients.

PRACTICES:

- Mobile health monitoring.
- Electronics in medical textile.
- Smart textiles in rehabilitation and applications.
- Textile sensors for healthcare.
- Legal and ethical values involved in the medical textile materials.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1.	Different types of materials used for biomedical applications.	Apply	1	1, 2, 4, 5, 9, 10, 12
2.	Functional requirements, types and evaluation of wound dressings and bandages.	Apply	1, 2	1, 2, 5, 9, 10
3.	Functional requirements and characterization of vascular grafts, sutures and scaffolds for tissue engineering applications.	Analyse	1, 2	1, 2, 3, 5, 9, 10
4.	Textile material used for hygiene and health care applications.	Analyse	2	1, 2, 5, 9, 10, 12
5.	Standards for testing, safety and ethical issues related to medical textiles.	Evaluate	1, 2	1, 2, 3, 4, 5, 9, 10, 12

TEXT BOOKS:

1. Anand S.C., Kennedy J.F. Miraftab M. and Rajendran S., "Medical Textiles and Biomaterials for Health Care", Wood head Publishing Ltd., 2006.

2. Joon B. Park. and Joseph D. Bronzino., "Biomaterials – Principles and Applications", CRC Press Boca Raton London, NewYork, Washington, D.C. 2002.

REFERENCE BOOKS:

1. Anand S., " Medical Textiles", Textile Institute, 1996, ISBN: 185573317X.

2. Horrocks A.R. and Anand S.C., "Technical Textiles", Textile Institute, 1999, ISBN: 185573317X.

3. Adanur S., "Wellington Sears Handbook of Industrial Textiles", Technomic Publishing Co. Inc., Lancaster Pennylvania, 1995, ISBN 1-56676-340-1.

4. Michael Szycher and Steven James Lee, "Modern Wound Dressing: A Systematic Approach to Wound Healing", Journal of Biomaterials Applications, 1992.

5. Allison Mathews and Martin Hardingham , "Medical and Hygiene Textile Production - A Hand Book", Intermediate Technology Publications, 1994.

22TT826 PROTECTIVE TEXTILES

Hours Per Week :

L	T	P	C
2	2	0	3

PREREQUISITE KNOWLEDGE: Basic knowledge of protective garment.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers details of protective clothing for various hazardous applications. The objective of this course is to impart knowledge manufacturing protective clothing.

MODULE-1

UNIT-1   **8L+0T+0P=08 Hours**

PROTECTIVE CLOTHING AND REQUIREMENTS:

Types of protective clothing and their requirements, Cold-protective clothing: Introduction, types of cold-protective clothing, Human responses to cold, Requirements of cold-protective clothing, Cold-water immersion suits, fit and sizing of immersion suits, Thermal ratings for immersion suits, Managing thermal protection/stress associated with cold water: the problem of water ingress.

UNIT-2   **8L+16T+0P=24 Hours**

PROTECTION AGAINST HEAT AND FLAMES:

Clothing for protection against heat and flames: Types, Requirements for heat- and flame-protective clothing, Challenges in managing thermal stress, Design of clothing for protection against heat and flames. Types of chemical, biological, radiological and nuclear (CBRN) threats, Personal protective equipment for specific routes of exposure.

PRACTICES:

- Design of clothing to protect wearers from the cold.
- Examples and applications of cold-protective clothing.
- Standards and testing for cold-protective clothing.
- Assessing the performance of immersion suits in resisting water ingress.
- Requirements of clothing for protection against hot-liquid splash and steam hazards.
- Standard test methods for evaluating chemical-protective materials.
- Standard test methods for evaluating whole CBRN ensembles.

MODULE-2

UNIT-1   **8L+0T+0P=08 Hours**

BALLISTIC-PROTECTIVE AND BODY ARMOUR:

Ballistic-protective clothing and body armour: UK military ballistic-protective clothing, Environmental operating conditions, Test methods, Thermophysiological aspects. Spacesuits: development and design for thermal comfort.

UNIT-2   **8L+16T+0P=24 Hours**

MEDICAL PROTECTIVE CLOTHING:

Medical protective clothing: Key requirements for surgical gowns: protection, Key requirements for surgical gowns: thermophysical comfort, Limitations of current surgical gowns.

SKILLS:

✓ *Know the safety precautions.*

✓ *Selection fabric for the purpose.*

✓ *Aware of standards and specifications.*

PRACTICES:

- Performance of surgical gowns: a case study.
- Measuring the thermal and water vapour resistance of surgical fabric assemblies.
- Thermal comfort attributes of various fabric assemblies.
- Thermal comfort attributes of various surgical ensembles.
- Modelling of cold stress and cold strain in protective clothing.
- Study of Cold-exposure survival and modeling offshore antiexposure garments.
- Modelling heat stress and heat strain in protective clothing.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1.	Categorizing different kind of protective clothing.	Apply	1	1, 2, 4, 5, 9, 10, 12
2.	Confident with selecting type of safety equipment's.	Analyse	1, 2	1, 2, 5, 9, 10
3.	Reviewing different classes safety garments.	Analyse	2	1, 2, 3, 5, 9, 10
4.	Appraising quality of the garment will give better protection.	Evaluate	2	1, 2, 5, 9, 10, 12

TEXT BOOKS:

1. Protective Clothing- Managing Thermal Stress, edited by Faming Wang and Chuansi Gao, The Textile Institute and Woodhead Publishing, 2014.

REFERENCE BOOKS:

1. Cut Protective Textiles, Daniel (Xuedong) Li, Elsevier Science, 2020.

22TT827 HOME TEXTILES

Hours Per Week :

L	T	P	C
2	2	0	3

Source : https://www.
smarthometextiles.
com/img/home-
projects.jpg

PREREQUISITE KNOWLEDGE: Basics of Home textiles, Furnishing fabrics and their structure, design and texture.

COURSE DESCRIPTION AND OBJECTIVES:

The goal of this course is to build a grasp of the Home textile materials and their types, functions in technical asset. Characterizing the structure of materials. Types and designs of home furnishings materials. Awareness on the selection of the Raw material suitable for the Home functional textiles with respect to the fibers, different products in the market.

MODULE-1

UNIT-1   **8L+0T+0P=08 Hours**

FURNISHINGS AND FLOOR COVERINGS:

Developments in Textile Furnishing; Type of Furnishings Materials – Woven and non-woven; Factors affecting selection of Home Furnishings.

Recent Developments in manufacturing of floor coverings -Hard Floor Coverings, Resilient Floor Coverings, Soft Floor Coverings, Rugs, Cushion and Pads; Care of floor coverings.

UNIT-2   **8L+16T+0P=24 Hours**

CURTAINS AND DRAPARIES:

Advances in Home decoration - Draperies – Choice of Fabrics, Curtains – Types of Developments in Finishing of Draperies; Developments in tucks and Pleats; uses of Drapery Rods, Hooks, Tape Rings and Pins.

PRACTICES:
- Case studies on two floor coverings of Home Textiles products.
- Case studies on the physical properties of curtains and draperies.
- Case studies on the materials used for the curtains, draperies and floor coverings.

MODULE-2

UNIT-1   **8L+0T+0P=08 Hours**

HOME FURNISHING AND BED LINENS:

Different styles, use of Colours, design & texture in home furnishing. Developments in living room furnishing including upholstery, Wall Hangings, Cushion, Cushion Covers, Bolster and Bolster Cover.

Advances in the production of - Different Types of Bed Linen, Sheets, Blankets, Blanket Covers, Comforts, Comfort Covers, Bed Spreads, Mattress and Mattress Covers, Pads, Pillows.

UNIT-2   **8L+16T+0P=20 Hours**

CURTAINS AND DRAPARIES:

Advances in the production of - Different Types of Bed Linen, Sheets, Blankets, Blanket Covers, Comforts, Comfort Covers, Bed Spreads, Mattress and Mattress Covers, Pads, Pillows.

PRACTICES:

- Case studies on design of bed sheets and blanket cover.
- Case studies on physical properties of the mattress and mattress covers.
- Case studies on the selection the raw material for filling the mattresses.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1.	Different types of materials used as home textiles.	Apply	1	1, 2, 4, 5, 9, 10, 12
2.	Selection of fabric and design for living room, bed room and kitchen furnishings.	Apply	1, 2	1, 2, 5, 9, 10
3.	Selection of floor coverings and draperies.	Analyse	1, 2	1, 2, 3, 5, 9, 10
4.	Finishes used for various home textile products.	Analyse	2	1, 2, 5, 9, 10, 12
5.	Evaluation of home textile products.	Evaluate	1, 2	1, 2, 3, 4, 5, 9, 10, 12

TEXT BOOKS:

1. Alexander.N.G., "Designing Interior Environment", Mas Court Brace Covanorich, Newyork, 1972.
2. Donserkery.K.G., "Interior Decoration in India", D. B. Taraporeval Sons and Co. Pvt. Ltd., 1973.

REFERENCE BOOKS:

1. Wingate I.B. & Mohler J.F., "Textile Farbics & Their Selection", Prentice Hall Inc., New York, 1984.
2. Irsak.C, " Nonwoven Textiles" Textile Institute", Manchester, 1999 3. Krcma.R., Manual of Non-wovens, Textile Trade Press, Manchester 1993.
3. Subtra Das, "Performance of home textiles", Woodhead Publishing India Pvt.Ltd., 2010, ISBN: 0857090070.

HONOURS/ SPECIALIZATION COURSES

B.Tech.

TEXTILE TECHNOLOGY

COURSE CONTENTS
I SEM & II SEM

22TT951 OPERATIONS RESEARCH FOR ENGINEERS

Hours Per Week :

L	T	P	C
3	2	0	4

PREREQUISITE KNOWLEDGE: Basic knowledge of research ideas.

COURSE DESCRIPTION AND OBJECTIVES:

Understand the need and scope of Operations Research for engineering applications. To learn the formulations of different models in Operations Research. To understanding the concepts of LPP, Assignment and Transportation and their applications for engineering process. To design a process with all variables and constraints and model it for a specific end use. To Plan for the various phases of Project..

MODULE-1

UNIT-1   10L+0T+0P=10 Hours

INTRODUCTION:

Introduction: Definition of OR, objectives, scope, phases and different models of OR, role of Operations Research in engineering, essential requirements of a problem. Linear programming model: Characteristics, assumptions, formulations and graphical solution, special cases of graphical solution.

UNIT-2   14L+16T+0P=30 Hours

TRANSPORTATION AND REPLACEMENT MODELS:

Transportation model: Objectives, types of transportation problems, lowest cost entry method and north west corner method.

Replacement models: Waiting line models: optimum replacement of age of items that deteriorate with time, optimum replacement of items that fail completely.

Decision theory: Need, elements of decision theory, simple problems with risk and uncertainty.

PRACTICES:

- Simplex: Contents of a simplex problem, types of simplex problem, Maximization, Minimization, two-phase method, duality and its objective, writing a dual problem for LPP and solving by simplex, dual simplex.
- Assignment Model: Objective, types of assignment problems, Hungarian method, profit maximization, Airline crew problem, special assignment problem.

MODULE-2

UNIT-1   10L+0T+0P=10 Hours

QUEUING SYSTEMS:

Queuing systems:Classification, characteristics of queuing systems, problems on Queuing theory. Project scheduling by PERT and CPM: Introduction to network analysis; Construction of network diagrams, calculation of floats, a brief note on Crashing of Networks.

UNIT-2   14L+16T+0P=30 Hours

SEQUENCING:

Sequencing: Need, assumptions, types of problems (n-job on 2 machines, n-job on three machines and 2 jobs on n-machines.

Source: https://engineering.berkeley.edu/wp-content/uploads/2020/02/3.1.5_IEOR2_MBC_COE_2015-2-19_JAC-LAB_PRINT-2567-scaled.jpg

PRACTICES:

● Inventory control: Need, Def, Significance types of decisions, types of Inventories, EOQ: elements, derivation for EOQ, simple problems with and without EOQ, A brief note on Production Model, Shortages.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	To select a model for a specific end use.	Apply	1	1, 2, 4, 5, 9, 10, 12
2	Design a production /marketing/ personnel case study and modeling it.	Apply	1, 2	1, 2, 5, 9, 10
3	Allocate the minimum resources with maximum returns	Analyse	1, 2	1, 2, 3, 5, 9, 10
4	Plan & Design a Transportation model in material handling andtransportation.	Analyse	2	1, 2, 5, 9, 10, 12

TEXT BOOKS:

1. Problems and solutions in Operation Research – Man Mohan and P. K. Gupta, Dhanpathi Roy & sons, New Delhi, 2010.
2. PERT and CPM – B.C. Punmia, Dhanpathi Roy & Sons, New Delhi, 2012.

REFERENCE BOOKS:

1. Operations Research : Pannerselvam, Tata-Mc-GrawHill, 5th edition, New Delhi, 2013.
2. Operations Research – S.K. Kapoor, Chand Publications, New Delhi, 2013.

22TT952 FASHION PRODUCT DEVELOPMENT

Hours Per Week :

L	T	P	C
3	2	0	4

Source : https://
fashinza.com/
textile/wp-content/
uploads/2022/04/
shutter-
stock_1627974340.
jpg

PREREQUISITE KNOWLEDGE: Basic knowledge of fashion products.

COURSE DESCRIPTION AND OBJECTIVES:

This course provides the fundamental concepts of fashion product development. The course also gives input for analyzing components of fashion product making process. The course intends to develop analytical skills involving concepts relating to fashion design, anthropometry and sizing, pattern making, seam construction and operations for fashion product development. The objective of this course is to inculcate the skills and Analyse fashion product development process in detail.

MODULE-1

UNIT-1   **10L+0T+0P=10 Hours**

FASHION DESIGN FUNDAMENTALS:

Design types: natural, stylized, geometric, historic and abstract; Garment design: structural, decorative and functional; Elements of Design: Line, shape, form, size, colour, texture and pattern; Principles of design: Harmony, Balance, Rhythm, Emphasis and Proportion; Introducing elements and principles of design in apparels.

Anthropometrics and sizing system for fashion product development: Anthropometry: Basic measurements, human anatomy, landmark terms, clothing sizing systems; Body Ideals; Eight head theory: body proportions, height and weight distribution; Important body measurements across all age groups; Methods of measuring body dimensions; Standard measurement chart designation and control dimensions.

UNIT-2   **14L+16T+0P=30 Hours**

PATTERN MAKING PRINCIPLES FOR FASHION PRODUCT DEVELOPMENT:

Functions of pattern making tools, preparing and measuring the form; Trueing, blending, pattern grain line, balance line terms, notches, seam allowance, jog seam, dart points, pleats, flares, gather and true bias; Pattern making: Drafting and draping methods; Basic men's and women's block.

PRACTICES:

- Dart manipulation: single dart series-slash-spread technique.
- Pivotal transfer technique.
- Two dart series: slash spread and pivotal transfer technique.
- Graduated and radiating darts and parallel darts.
- asymmetric and intersecting darts.
- Types of added fullness and contouring principle.

MODULE-2

UNIT-1:   **10L+0T+0P=10 Hours**

STITCHING PRINCIPLES FOR FASHION PRODUCT DEVELOPMENT

Seams: Definition, types of seams, seam quality, seam performance, factors to be considered in the selection of seam, seam finishes, seam defects; Men's and women's tops: Basic bodice blocks, collars, sleeves, cuffs, plackets, pleats, gathers and darts; Functional purpose of components in garment construction.

UNIT-2   **14L+16T+0P=30 Hours**

OPERATIONS FOR FASHION PRODUCT DEVELOPMENT

Operation breakdown for shirts, trousers, jackets, waist coats, T shirts, casual bottoms; Material flow, cut component progresses, machinery allocation, man power allocation. Line set up, production line balancing; Different production system, manual system, make through system, batch production system, progressive bundle system, straight line system, conveyor belt system, unit production system, modular production system, quick response system and Just in time system.

PRACTICES:

Stitches :
- Definition, stitch classes.
- stitch parameters.
- factors to be considered in the selection of stitches.
- Stitching defects.

Sewing Thread:
- Types.
- Construction of sewing thread.
- Sewing thread quality.
- Selection of sewing thread.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Apply the knowledge of elements of design and principles of design to create new design on paper, graphics, textile and garments.	Apply	1	1, 2, 4, 5, 9, 10, 12
2	Applicationof computer knowledge and SKILLS:: like CAD and Computer Graphics to design and create new and industry ready Surface or Garment or Style on computer.	Apply	1, 2	1, 2, 3, 5, 9, 10
3	Design a garment or a product by draping or flat pattern making or by using hands on skill or stitching to construct the product to meet desired specification, performance and capabilities.	Analyse	1, 2	1, 2, 5, 9, 10
4	Evaluate different concepts involved in pattern making, stitching 4 and production operations of fashion product.	Analyse	2	1, 2, 5, 9, 10, 12
5	Examine the advantages and disadvantages of different seams, stitches and production process of fashion products.	Evaluate	1,2	1, 2, 3, 5, 9, 10

TEXT BOOKS:

1. Kathryn McKelvey and Janine Munslow, "Fashion Design: Process, Innovation and Practice", Blackwell Publishing, USA, 2005, ISBN: 978-0-470-65577-1.
2. Jacob Solinger, "Apparel Production Handbook", Reinhold Publications,1998.

REFERENCE BOOKS:

1. Ruth E. Glock, Grace I. Kunz, "Apparel Manufacturing, Sewn Product Analysis", 4th edition, Pearson Education, ISBN: 8177580760159.
2. Laing R.M., Webster J, "Stitches & Seams", The Textile Institute, India,1998.
3. Carr H and Latham B., "The Technology of Clothing Manufacturing", Blackwell, U.K., 1994.
4. Shaeffer Claire, Sewing for the Apparel Industry, Prentice Hall, New Jersey, 2001.
5. Helen Joseph, Armstrong, "Patternmaking for Fashion Design", Pearson Education Pte. Ltd., 2005.

22TT953 APPAREL PRODUCTION PLANNING AND PROCESS CONTROL

Hours Per Week :

L	T	P	C
3	2	0	4

PREREQUISITE KNOWLEDGE: Basic knowledge of Apparelindustry.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers the production planning of apparel and processes involved in the apparel manufacturing process. It emphasis on the improved methods of material control in apparel production. To apprise student with quality concepts for implementing quality in apparel production.

Source : https://static. fibre2fashion. com// articleresources/ images/31/3055/ quality-systems- for-garment- manufacture.jpg

MODULE-1

UNIT-1   **10L+0T+0P=10 Hours**

CONTROL PARAMETERS AND PRODUCTION PLANNING PARAMETERS

Control parameters and basic data of styles and generalised garment types, new program analysis, style wise design wise analysis on production parameters, product development and duplication. Concepts of concurrent engineering, reverse engineering, production planning and time and action calendar, steps between prototypes to approved sample-production sample, product data management and understanding specification sheets and effective communication.

UNIT-2   **14L+16T+0P= 30 Hours**

IDENTIFICATION OF BOTTLE NECKS AND MACHINERY ALLOCATION:

Operation break down and production sequence, identification of bottle necks and critical area, operation wise machinery allocation, usage of special attachments and tools for operation simplifications, production grid and flow chart.

PRACTICES:

- Studies on Cutting techniques and cutting room controls,
- Lay lot planning,
- Bundle distributions,
- Modern methods in cut piece distribution
- Tracking different manufacturing systems,
- Mass customisation and made to order manufacturing systems

MODULE-2

UNIT-1   **10L+0T+0P=10 Hours**

KIND OF PORODUCTION PLANNING:

Production planning -Production floor balancing, line balancing, allocation of man power, production set up planning for a shirt factory, production set up planning for a bottoms and jacket factory, production set up planning for a fully integrated apparel manufacturing plant, conveyor system and control parameters.

UNIT-2   **14L+16T+0P= 30 Hours**

QUALITY CONTROL

Quality control in product development, quality control in printing, embroidery, washing and other accessories, quality planning, preproduction meetings and quality procedures, production meetings, in line inspection, final inspection, rescreening conditions and final inspections. Packing Ratio packing, solid packing, short shipment, excess shipment, calculation of volumetric weight, carton dimension other requirements.

22TT954 APPAREL MARKETING AND MERCHANDISING

Hours Per Week :

L	T	P	C
3	2	0	4

PREREQUISITE KNOWLEDGE: Basic knowledge of Apparelindustry.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers the marketing of apparel and role of merchandiser in apparel manufacturing. To acquaint the students of the concepts of business, merchandising, sourcing and export documentation.

Source : https://www. mksmilanofashionschool. com/uploads/catalogo/ foto-37.jpg

MODULE-1

UNIT-1   **10L+0T+0P=10 Hours**

INTRODUCTION TO APPAREL BUSINESS:

International apparel business pattern, basic business concepts in Indian apparel export house,business operations in China and other south Asian countries. Business patterns for Indianapparel retail and home textiles. Understanding from concept board to finished product and its sequence.

UNIT-2   **14L+16T+0P=30 Hours**

MARKETING FOR APPAREL AND TEXTILE PRODUCTS:

Defining marketing, marketing mix the objectives of marketing department, market research,different types of markets, marketing strategies with respect to a product/brand, Indianapparelhouses international marketing strategies and domestic marketing strategies, marketing models, Bto B marketing, B to C marketing, direct marketing, digital marketing.

PRACTICES:

- Case studies on export of yarn.
- Case studies on export of woven fabric.
- Case studies on export of knitted goods.
- Case studies on export of technical textiles.

MODULE-2

UNIT-1   **10L+0T+0P=10 Hours**

MERCHANDISING:

Concepts of merchandising, concepts and apparel product lines, dimensions of product change,determination and development of product line and product range. Creative and technical designin garments and accessories, new product development and seasons of sale, costing, coordinationand communication with the production house and export house

UNIT-2   **14L+16T+0P= 30 Hours**

SOURCING:

Understanding the basics of sourcing, sourcing strategy and best sourcing practice in apparel and textile businesses, supply chain and demand chain understanding, sourcing negotiations, globalco-ordination in sourcing, materials management and quality in sourcing, quick response andsupplier partnership in sourcing, JIT technology.

PRACTICES:

- Case studies on import of natural fibres,
- Case studies on import of synthetic fibres
- Case studies on import of silk goods
- Case studies on port of technical textiles

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Sorting ofmarkets for apparel goods.	Apply	1	1, 2, 4, 5, 9, 10, 12
2	Organizing stages of apparel production.	Apply	1, 2	1, 2, 5, 9, 10
3	Balance the supply units for better production.	Analyse	2	1, 2, 3, 5, 9, 10
4	Structure new concepts in apparel marketing.	Evaluate	2	1, 2, 5, 9, 10, 12

TEXT BOOKS:

1. Elian stone, Jean A samples, "Fashion Merchandising", McGraw Hill Book Company, NewYork, 1985.
2. Philip Kotler, Kevin Lane Keller, Abraham Koshy, and Mithileshwar Jha , "MarketingManagement A South Asian Perspective", Pearson Education, New Delhi, 2006.

REFERENCE BOOKS:

1. Shivaramu S., "Export Marketing – A Practical Guide to Exporters", Wheeler Publishing,Ohio, 1996.
2. Warren. J. Keegan and Mark.C.Green , "Global Marketing", Pearson Prentice Hall, NewDelhi, 2005.
3. Grace I. Kunz , Ruth E. Glock, "Apparel Manufacturing: Sewn Product Analysis", 4thEdition. Prentice Hall, 2004.
4. Ruth E. Glock, Grace I. Kunz " Apparel Manufacturing Sewn Product Analysis" FourthEdition, Pearson Prentice Hall, NJ, 2005.

22TT955 LEAN AND SIX SIGMA FOR TEXTILES AND APPAREL

Hours Per Week :

L	T	P	C
3	2	0	4

PREREQUISITE KNOWLEDGE: Basic knowledge of quality aspects.

COURSE DESCRIPTION AND OBJECTIVES:

To provide the fundamental knowledge of concepts of Lean Manufacturing. To provide knowledge of six sigma and its concepts. To develop the understanding of statistical tools used in lean and six sigma concepts. To provide the knowledge of lean tools and lean implementation. To educate the students about modern methods of maintaining inventory and lean culture.

Source : https://apparelresources.com/wp-content/uploads/2015/09/QMS.jpg

MODULE-1

UNIT-1   **10L+0T+0P=10 Hours**

LEAN MANUFACTURING:

Definition and brief description of the five primary elements of lean manufacturing, lean manufacturing approach, roadmap, implementation methodology, lean manufacturing principles, expected benefits; Introduction to mass productionsystem, origin of lean production system, necessity, lean revolution in toyota, systems and systemsthinking, basic image of lean production, customer focus, muda (waste).

UNIT-2   **14L+16T+0P=30 Hours**

INTRODUCTION TO LEAN PRINCIPLES AND SIX SIGMA CONCEPTS:

Introduction to lean principles and six sigma concepts:Similarities and differences, synergy, evolution of lean six sigma, lean six sigma approach methodology, phases, managing lean six sigma project, six sigma methodologies (DMAIC, DMADV, DFSS).

PRACTICES:
- Case studies on Statistical process control.
- Case studies on process capability analysis sigma computation.
- Case studies on ANOVA test.
- Case studies on design of experiments.
- Case studies on chi-square test.
- Case studies on regression analysis.
- Case studies Stability of lean system Standards in the lean system.

MODULE-2

UNIT-1   **10L+0T+0P=10 Hours**

LEAN TOOLS:

Value Stream Mapping, Poka Yoke, Time Analysis, Push-Pull Systems, Waste Elimination, Total Productive Maintenance, Failure Mode Effect Analysis, Standard Work PRACTICES:, Control Plans, SMED, Visual control, Kaizen–Case studies, Principles of JIT–JIT system, Kanban, Kanban rules, Expanded role of conveyance, Production leveling, Value stream mapping, Lean six sigma implementation: Identifying Lean Six Sigma Projects, Define Scope, Planning for Implementation, Selection of tools and techniques for each phase, measuring the Benefits.

UNIT-2   **14L+16T+0P=30 Hours**

OTHER LEAN CONCEPTS:

Jidoka (automation with a human touch) : Jidoka concept, Poka-Yoke (mistake proofing) systems, Inspection systems and zone control, Types and use of Poka-Yoke systems, Implementation of Jidoka; Worker involvement and systematic planning methodology: Involvement, Activities to support involvement activities to support involvement,

PRACTICES:

- Case studies on quality circle activity.
- Case studies on kaizen training.
- Case studies on suggestion programmes.
- Case studies on hoshin planning system (systematic planning methodology).
- Case studies on Phases of Hoshin Planning, Lean culture.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes :

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Six sigma tools in the industry.	Apply	1	1, 2, 4, 5, 9, 10, 12
2	Capable in Apply advanced statistical tools in analyzing results.	Apply	1, 2	1, 2, 3, 5, 9, 10
3	Implement the lean tools effectively.	Analyse	1, 2	1, 2, 5, 9, 10
4	Capable in Apply advanced lean tools in getting more production.	Evaluate	2	1, 2, 5, 9, 10, 12

TEXT BOOKS:

1. Pascal Dennis, Lean Production Simplified: A Plain-Language Guide to the World's Most Powerful Production System, (Second edition), Productivity Press, New York, 2007.

2. Jeffrey Liker, The Toyota Way : Fourteen Management Principles from the World's Greatest Manufacturer, McGraw Hill, 2004.

REFERENCE BOOKS:

1. Michael L. George, Lean Six SIGMA: Combining Six SIGMA Quality with Lean Production Speed, McGraw Hill, 2002.

2. Taiichi Ohno, Toyota Production System: Beyond Large-Scale Production,Taylor& Francis, Inc., 2010.

3. Thomas Pyzdek,The Six Sigma Handbook ,McGraw-Hill, 2000.

4. Field W M, "Lean Manufacturing: Tools, Techniques, and How to Use Them", St.Lucie Press, London, 2001.