**DKTE Society’s**

**TEXTILE & ENGINEERING INSTITUTE**

**Rajwada, Ichalkaranji - 416115**

**(An Autonomous Institute)**

DEPARTMENT: TEXTILES

CURRICULUM

M. Tech. Textile Engineering Program

First Year

With Effect From

2023-2024



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| **DKTES Textile and Engineering Institute, Ichalkaranji**  **First Year M. Tech. (Semester – I)**  **01TEL501: High Performance Fibres** | | | | |
| Teaching Scheme:  Lectures: 03 Hrs./Week | | Credits  03 | Evaluation Scheme:  SE 1: 25Marks  SE 2: 25Marks  SEE: 50Marks | | |
| **Course Objectives:**   1. To explain the importance of high-performance fibres and critical comparison of high-performance fibres with regular fibers 2. To describe the manufacturing processes of commonly available high-performance fibres 3. To discuss the structure and properties of high-performance fibres 4. To explain the technology of manufacturing bicomponent fibres | | | | | |
| **Course Outcomes:**  On completion of the course, student will be able to–   1. Express the importance of high-performance fibres and contrast high performance fibres with regular fibers 2. Illustrate the manufacturing processes of commonly available high-performance fibres 3. Compare the structure and properties of various high-performance fibres 4. Demonstrate the technology of manufacturing bicomponent fibres | | | | |
| **Course Contents** | | | | |
| **Unit I** | **Significance of High-Performance Fibres** | | | **04 Hours** |
| Significance of high-performance fibres. Critical comparison of Regular and High-performance fibres, Review of various fibre manufacturing processes. | | | | |
| **Unit II** | **Aramid Fibres** | | | **08 Hours** |
| Manufacturing of aramid fibres, Analysis of structure and characteristics of important aramid fibres, Studies on the applications of aramid fibres | | | | |
| **Unit III** | **HPPE &** **fully aromatic Polyester fibres** | | | **06 Hours** |
| Manufacturing of high-performance polyethylene and fully aromatic polyester fibres, Analyses of characteristics of high-performance polyethylene fibres and fully aromatic polyester fibres. Studies on the applications of these fibres. | | | | |
| **Unit IV** | **Glass, Ceramic Fibres** | | | **06 Hours** |
| Inorganic high-performance fibres: Glass fibre manufacture, properties, and Applications. Ceramic Fibres: Analysis of characteristics and applications of silicon carbide-based fibres, Alumina based fibres. Single  crystal oxide fibres. | | | | |
| **Unit V** | **Fibre Characteristics** | | | **08 Hours** |

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| Critical analyses of fibre characteristics and applications of Chlorinated fibres: PVDC, Fluorinated Fibres: PTFE, PVF, PVDF and FEP, Poly (entheretherketones): PEEK Poly (phenylene sulphide): PPS Poly (ether  imide): PEI, PBI, and PBO. | | |
| **Unit VI** | **Bicomponent Fibres Developments** | **04 Hours** |
| Technological developments in the manufacturing of bicomponent fibres, importance, and applications of bicomponent fibres. | | |
| **References Books:** | | |
| 1 High Performance Fibres, Edited by J. W. S. Hearle, Published by wood head publishing Ltd., England in association with Textile Institute Manchester  2 Carbon fibers by J. P. Donnet and R. C. Bansal, Marcel Dekker, New York  3 Hand book of Fibres Science and Technology, High Technology Fibres, Edited by Manachem Lewin and Jack Preston  4 New fibers. T. Hongu and G. 0. Phillips Ellis Horwood Ltd, Chichester  5 Kevlar aramid fiber. by H.H. Yang. John Wiley and Sons, Chichester, New York  6 Mukhopadhyay S. K., “Advances in Fibre Science” The Textile Institute. 1992, ISBN: 1870812379  7 Gupta V.B. Textile Fibres: Developments and Innovations. Vol. 2, Progress in Textiles: Science and Technology. Edited by V.K. Kothari, IAFL Publications, 2000. | | |
| **Supplementary Readings :** | | |
| weblinks, journal articles, conference proceedings book chapters etc | | |

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| **DKTES Textile and Engineering Institute, Ichalkaranji**  **First Year M. Tech. (Textile Engineering) (Semester –First)**  **01TEL551: Advanced Computer Programming and Application** | | | | | |
| Teaching Scheme: Lectures: 3 Hrs./Week | | Credits  03 | Evaluation Scheme:  SE 1: 25 Marks  SE 2: 25 Marks  SEE: 50 Marks | | |
| **Course Objectives:**  1. To describe the Object-oriented programming using C++ and python  2. To explain the relational databases & data analysis, data visualization  3. To illustrate the applications of ERP and its related technologies with real life example  4. To explain the applications of SAP, its advantages and business intelligence | | | | | |
| **Course Outcomes:**  At the end of the course, students will be able to  1. Describe the significance and scope of programming using C++ and python  2. Explain the technical details of relational databases. To describe data analysis and visualization  3. Compile the various properties, functions, merits and applications of ERP  4. Evaluate the suitability of SAP and business intelligence for various applications and | | | | | |
| **Course Contents** | | | | | |
| **Unit I** | **Object-oriented programming using C++ and Python** | | | | **8 Hours** |
| Introduction to object-oriented programming, basic program construction, Decision making statement, Loop, Function, Class and Object, Inheritance, Polymorphism. Basics of Python Programming, Data types, Control structures, Modularization and Classes, Object oriented design in python, Python inheritance, Python polymorphism. | | | | | |
| **Unit II** | **Relational Database design** | | | | **7 Hours** |
| Basic System Development Life Cycle, Database design – ER to Relational, Functional dependencies, Normalization, Normal forms based on primary keys (1NF, 2NF, 3NF, BCNF, 4NF, 5NF), Loss less joins and dependency preserving, decomposition. | | | | | |
| **Unit III** | **Data Analysis & Visualization using Python** | | | | **6 Hours** |
| **Numpy:** Creating Arrays, Array indexing, Array Slicing & Built-in  **Functions Pandas:** Series, Framework, Built-in Functions of pandas  **Matplotlib:** Plotting, marker, labels, grid, scatter, bars, histograms, pie charts. Seaborn Libraries. | | | | | |
| **Unit IV** | **ERP and Its Related Technologies** | | | | **6 Hours** |
| Introduction to ERP, Basic ERP concepts, Justifying ERP Investments, RISK of ERP, Benefits of ERP, Decision support System (DSS), Business process reengineering (BPR), Product life cycle management, Supply Chain Management (SCM), Customer Relationship Management (CRM). Business analytics - Future trends in ERP systems-web enabled, Wireless technologies, cloud computing. Use of ERP in Textile industries. | | | | | |
| **Unit V** | **SAP: Architecture** | | | | **6 Hours** |
| Architecture of SAP R/3, SAP Services Overview, SAP Integrated- Analysis, Implementation, and Design, Three-Tier Architecture, Need of Multi-tier Architecture, Integrating Environments. | | | | | |
| **Unit VI** | **Business Intelligence System** | | | **6 Hours** | |
| Technical Architecture overview, Back-room Architecture, Presentation Server Architecture, Front room Architecture, Metadata, Standard Reports, Dashboards and Scorecards. | | | | | |
| **Reference Books:** | | | | | |
| 1. Object Oriented Programming with C++ - by E. Balagurusamy.  2. Let us C++ - by Y.P. Kanitkar  3. Python Programming Using Problem Solving Approach- by Reema Thareja,  4. Database System Concept – by Henry F. Korth, Abraham Silberschatz, Sudarshan  5. Enterprise Resource Planning – by Alexis Leon, TMH.  6. <https://sapbasic.files.wordpress.com/sap_r3_handbook.pdf> | | | | | |
| **Supplementary Readings:**  weblinks, journal articles, conference proceedings book chapters etc. | | | | | |

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| **DKTES Textile and Engineering Institute, Ichalkaranji**  **First Year M. Tech. (Semester – I )**  **01TEL502: Theory of Textile Structures** | | | | | | |
| Teaching Scheme:  Lectures: 03 Hrs./Week | | | Credits  03 | Evaluation Scheme:  SE 1: 25Marks  SE 2: 25Marks  SEE: 50Marks | | | |
| **Course Objectives:**   1. To describe the morphology of fibre. 2. To study the Tensile and other properties of fibres 3. To illustrate the Theories of time dependence 4. To explain the structure of yarn | | | | | | | |
| **Course Outcomes:**  On completion of the course, student will be able to–   1. Describe the morphology of fibre. 2. Study the Tensile and other properties of fibres 3. Illustrate the theories of time dependence. 4. Explain the yarn structure. | | | | | | |
| **Course Contents** | | | | | | |
| **Unit I** | | **Fibre Structure** | | | | **06 Hours** |
| Requirements of fibre formation, morphological model, one phase two phase and three phase models, morphology of cotton, viscose, Wool. Silk, polyester, nylon 6 & nylon 66, acrylic, polypropylene fibres. | | | | | | |
| **Unit II** | | **Tensile & directional properties and elastic recovery of fibres** | | | | **06 Hours** |
| Importance of tensile properties, factors affecting the tensile properties of fibres, elastic recovery-effect of test conditions on elastic recovery ,stress and strain dependent elastic recovery, mechanical conditioning of fibre, swelling recovery. Effects of variability – Elastic recovery – Time effects – fibre stress and deformation other than tensile – Bending and bending fatigue – shear properties – loop strength and knot strength – Torsional properties. | | | | | | |
| **Unit III** | | **Time Effects** | | | | **07 Hours** |
| The study of time dependence, creep,factors affecting the creep, stress relaxation, time and tensile testing, dynamic tests, methods of dynamic testing, Boltzmann superposition principle,WLF equation,viscoelasticity-Eyring model of visco-elasicity, thermodynamic effects. | | | | | | |
| **Unit IV** | | **Nature and mechanism of Heat setting of fibres** | | | | **05 Hours** |
| Physics of heat setting– Heat setting and structural parameters – Mechanism of heat setting – Thermodynamic Argument of heat setting – multiple sequence – structural model. | | | | | | |
| **Unit V** | | **Ideal Yarn** | | | | **06 Hours** |
| Ideal geometry of twisted yarns, yarn contraction on twisting – limit of twist, packing of fibres in yarn, concentrating and disturbing features of actual yarn, specific volume and packing fraction, effect of twist on yarn  diameter and volume-Schwarz constant. | | | | | | | |
| **Unit VI** | **Migration of fibres in a yarn** | | | | **07 Hours** | | |
| Ideal migration, geometrical approach, tracer fibre technique, characterization of migration, theory of migration, migration in spun yarns, tension variation as mechanism of migration, order of migration. | | | | | | | |
| **References Books:** | | | | | | | |
| 1 Fibre Science – Edited by J.M. Preston, Published by The Textile Institute, Manchester.  2 Cotton Testing by Steadman,  3 Physical Testing of Textiles by B.P. Saville  4 Physics of Fibres – An Introductory Survey – Woods H.J. published by The Institute of Physics – London, 1955.  5 Physical Properties of Textile Fibres – Morton W.E. and Hearle J.W.S. published by The Textile Institute Manchester.  6 Fibre Microscopy – Stores J.L. – published by London National Trade Press.  7 Structure / Property relationship in Textile Fibres – Textile Progress Vol.20, No.4 – The Textile Institute, Manchester.  8 Fibre Science – Edited by J.M. Preston, Published by The Textile Institute, Manchester. | | | | | | | |
| **Supplementary Readings :** | | | | | | | |
| weblinks, journal articles, conference proceedings book chapters etc | | | | | | | |

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| **DKTES Textile and Engineering Institute, Ichalkaranji**  **First Year M. Tech. (Semester – I )**  **01TEL531: Advanced Yarn Manufacturing** | | | | | | |
| Teaching Scheme:  Lectures: 03 Hrs./Week | | | Credits  03 | Evaluation Scheme:  SE 1: 25Marks  SE 2: 25Marks  SEE: 50Marks | | | |
| **Course Objectives:**   1. To explain opening and cleaning principles of blow room machinery and process parameters involved in it and to describe fibre blending and process. 2. To describe design aspects of different zones of card theory and process parameters involved in it, design aspects of comber and theories of drafting. 3. To explain design developments in various components of ring frame, theories of balloon spinning geometry, tension and process parameters involved in it. 4. To describe technical developments in rotor spinning, air jet spinning and friction spinning along with parameters involved in the process | | | | | | | |
| **Course Outcomes:**  On completion of the course, student will be able to–   1. Critically analyze various aspects of opening and cleaning in blow room machinery, fibre blending and also parameters involved in the process. 2. Critically analyze design aspects of different zones of card various components of a comber, theories of drafting and process parameters involved in each process stage 3. Critically analyze design developments in various components of ring frame, theories of ring spinning and parameters involved in the process. 4. Critically analyze technical developments in rotor spinning, air jet spinning and friction spinning along with parameters involved in the process. | | | | | | |
| **Course Contents** | | | | | | |
| **Unit I** | | **Opening and cleaning** | | | | **07 Hours** |
| Evolution of opening and cleaning process. A critical study of factors affecting opening, cleaning and blending in blow-room. Critical design aspects and principles of modern blow-room machinery.  Fibre Blending – Importance, Methods of blending and its analysis. | | | | | | |
| **Unit II** | | **Carding** | | | | **07 Hours** |
| Basic theories of carding. Critical design aspects in different zones of modern card, Conditions of fibre transfer and Transfer efficiency. Design developments of carding components. Configuration and disorder of fibres in a card sliver. | | | | | | |
| **Unit III** | | **Combing/Drafting/Speed frame** | | | | **08 Hours** |
| Combing: Researches on combing preparation. Critical design aspects in various components of a comber. Fibre fractionation at comber, Evolution of combing process and technology.  Drafting: Theories of drafting. Causes for irregularity in drafted strand. Role of fibre friction in drafting – Drafting force – Definition, Measurement and study of factors affecting drafting force. Design significance of modern draw frames. Auto leveling: - Concept and necessity.  Speed frame: Evolution of speed frame machines and process. Design significance of modern Speed frames. | | | | | | |
| **Unit IV** | | **Basic stages in spinning & their influence on final product** | | | | **06 Hours** |
| Developments in various components of ring frame. Role and importance of spinning geometry. Mechanism of end breaks. Generation and control of hairiness in ring spinning – development of compact spinning. | | | | | | |
| **Unit V** | | **Rotor spinning** | | | | **04 Hours** |
| Technical developments in rotor spinning machine – Modification in the design of spinning unit – developments in rotor drives –yarn monitoring. Automation in rotor spinning machines. Structure and properties of yarn produced. | | | | | | | |
| **Unit VI** | **Air jet spinning** | | | | **04 Hours** | | |
| Technical developments in air jet spinning, Structure and properties of air jet spun yarns, Evolution of vortex spinning, critical review of both systems.  Friction Spinning – structure & properties of friction spun yarn. Evolution of different spinning technologies based on friction spinning system. | | | | | | | |
| **References Books:** | | | | | | | |
| 1 Manual of Cotton spinning series vol 1,2,3,4.  2 Short staple spinning Series by W Klein. Vol 1, 2, 3,4,5,6.  3 Rotor Spinning by K R Salhotra.  4 Yarn Production-Theoretical Aspects by Grossberg & C.Iype.  5 Series publications of NCUTE Training Programs  6 Textile Progress Series by Textile Institute, Manchester  7 New spinning technologies – Dr. S. M. Ishtiaque – Advances in yarn manufacturing technology – IIT publication  8 Research Papers on basics and advances in Technology. | | | | | | | |
| **Supplementary Readings :** | | | | | | | |
| weblinks, journal articles, conference proceedings book chapters etc | | | | | | | |

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| **DKTES Textile and Engineering Institute, Ichalkaranji**  **First Year M. Tech. (Semester – I)**  **01TEL532: Advanced Chemical Processing** | | | | | | |
| Teaching Scheme:  Lectures: 03 Hrs./Week | | | Credits  03 | Evaluation Scheme:  SE 1: 25Marks  SE 2: 25Marks  SEE: 50Marks | | | |
| **Course Objectives:**   1. To discuss need of modification and commercial trends in pretreatments with respect to environmental issue. 2. To discuss developments in dyes and colouration techniques and digital printing 3. To discuss colouration and finishing of denim fabric, processing of specialty material like linen, spandex and terry material 4. To discuss advancement in machines with respect to energy and water conservation. | | | | | | | |
| **Course Outcomes:**  On completion of the course, student will be able to–   1. Explain need of modification and commercial trends in pretreatments with respect to environmental issue. 2. Enumerate developments in dyes and colouration techniques and digital printing 3. Explain colouration and finishing of denim fabric, processing of specialty material like linen, spandex and terry material 4. Explain advancement in machines with respect to energy and water conservation | | | | | | |
| **Course Contents** | | | | | | |
| **Unit I** | | **Pre-Treatment** | | | | **06 Hours** |
| Developments in singeing, desizing and its eco-aspects, size recovery; Enzyme and solvent scouring; Bleaching and its eco-aspects, Per acetic acid bleaching, Redox bleaching, Ecofriendly stabilizers; Combined operations; Hot and ammonia and add-on mercerization; Pre-treatment and enzyme assisted processing of jute, linen, silk and lyocell. | | | | | | |
| **Unit II** | | **Dyeing** | | | | **06 Hours** |
| Dyeing and its eco-aspects, new dyes and their advantages. Eco-friendly dyeing with sulphur and vat dyes. New developments in reactive dyes like HF dyes, low and no salt reactive dyes, multifunctional dyes, neutral fixing and acid fixing reactive dyes. Photo chromic dyes, thermo chromic dyes, fluorescent dyes.  Concept, mechanism, methods and techno economical features of Super critical CO2 dyeing, Ultrasound assisted dyeing. | | | | | | |
| **Unit III** | | **Printing** | | | | **06 Hours** |
| Digital Printing: Concept, methods of inkjet printing, color separation, selection of dyes and developments in inks, techno-economical features Transfer Printing: Concept, selection of dyes and paper, mechanism of  dye transfer, process sequences and techno-economical features. | | | | | | |
| **Unit IV** | | **Processing of Denim** | | | | **07 Hours** |
| Chemistry and processes of warp dyeing with indigo, Indigo dyeing techniques – warp sheet and rope dyeing machine. Dyeing with mixture of indigo and other dyes. Processing of denim fabrics. | | | | | | |
| **Unit V** | | **Processing Specialty fibres and Fabrics** | | | | **07 Hours** |
| Processing Specialty fibres and Fabrics Terry towel: Process sequence and machines used for terry towel manufacturing, essential properties type and application of terry fabrics. Different stages of towel processing and finishing. Processing of Lyocell: General properties and uses of lyocell Pretreatment, dyeing and finishing of lyocell. Concept of fibrillation, its causes and remedies. Processing of Fabric containing Spandex: Properties and uses of spandex fibres and blends. Wet processing of its blends with Cotton and polyester. | | | | | | | |
| **Unit VI** | **Finishing and energy conservation** | | | | **08 Hours** | | |
| Finishing and energy conservation: Resin, SPF, Antimicrobial and Flame-retardant finishes. Various low liquor and minimum application techniques in textile finishing, their advantages, and limitations; means to water conservation.  Energy Conservation: Thermal energy, Steam generation, distribution and utilization; means for thermal energy conservation. Norms, HUE factor and consumption calculations. Electrical energy, quality requirement, power factor, illumination norms, consumption calculations and various means to conserve electrical energy. | | | | | | | |
| **References Books:** | | | | | | | |
| 1 Chemical Finishing of Textiles by W. D. Schindler and P. J. Hauser  2 Environmental Issues – Technology option for Textile Industry Edited by R. B. Chavan, Indian Journal of Fibre & Textile Research Special Issue - March, 2001  3 Energy conservation in Textile wet processing, M L Gulrajani, Omega Publication, New Delhi  4 Denim a Fabric for All by dr. Parmar, NITRA  5 Manufacturing of Terry Towel by Subhash J. Patil, Universal Book Corporation, Mumbai  6 Trouble shooting in Wet Processing: Acetate, Reyon / Lyocell and Spandex Blends, AATCC | | | | | | | |
| **Supplementary Readings:** | | | | | | | |
| weblinks, journal articles, conference proceedings book chapters etc. | | | | | | | |

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| **DKTES Textile and Engineering Institute, Ichalkaranji**  **First Year M. Tech. Textile Engineering (Semester –I)**  **01TEL533: Advances in Apparel Production** | | | | | | |
| Teaching Scheme: Lectures: 03 Hrs./Week | | Credits  03 | Evaluation Scheme:  SE-1: 25 Marks  SE-2: 25 Marks  SEE: 50 Marks | | | |
| **Course Objectives:**   1. To explain principles of computer-aided fabric colour matching. 2. To describe the advances in apparel sizing and fit. 3. To illustrate computerized pattern making system in garment production. 4. To explain advances in sewing technology. | | | | | | |
| **Course Outcomes:**  At the end of the course, students will be able to  1. Discuss the principles of computer-aided fabric colour matching.  2. Describe the advances in apparel sizing and fit.  3. Demonstrate the computerized pattern making system in garment production.  4. Illustrate the advances in sewing technology. | | | | | | |
| **Course Contents** | | | | | | |
| **Unit I** | **Apparel Engineering** | | | | **06 Hours** | |
| Introduction. Types of apparel categories. Apparel design and manufacture process for end use requirements. Fabric specifications and characteristics. – physical, durability and comfort. Kawabata and FAST systems for assessing fabric making-up performance. | | | | | | |
| **Unit II** | **Computer-aided Fabric Colour Matching** | | | | **06 Hours** | |
| Computer-aided colour matching of apparel fabric - principles and problems in maintaining colour integrity. Colour theory. Colour Matching Technology. Colour communication and approval. Technological advances in matching colours. | | | | | | |
| **Unit III** | **Advances in Apparel Sizing & Fit** | | | | **06 Hours** | |
| Key issues affecting apparel sizing and fit. Importance and development of size charts. Application of Size Chart. Three-dimensional body scanning to improve fit. Types of body scanning technology - Light-based systems, Laser-based systems, Microwave-based systems. Advantages of body scanning technology. Disadvantages of body scanning technology. | | | | | | |
| **Unit IV** | **Computerized Pattern Making in Garment Production** | | | | **06 Hours** | |
| Principles of pattern making. Garment balance. Pattern Grading. Computerized made-to-measure systems. Technological advances in pattern making. Material Utilization. Computer-aided garment design using three-dimensional body models. User interface for three-dimensional design. Future Trends. | | | | | | |
| **Unit V** | **Developments in Sewing Technology** | | | | **06 Hours** | |
| Development of the industrial sewing machine. Advances in sewing-needle design. Advances in sewing-thread technology. Advances in sewing-machine automation. Semi-automated sewing equipment. Computer numerical controls for sewing machines. Future trends in clothing technology. | | | | | |
| **Unit VI** | **Developments in apparel knitting technology** | | | **06 Hours** | |
| Principles of knitting. Shaping Technologies. Post-knitting – construction methods. Weft knitwear in fashion applications. Future trends. | | | | | |
| **References Books:** | | | | | |
| 1. Fairhurst, C., ‘Advances in Apparel Production’, Woodhead Publishing Limited. 2008. 2. Solinger, J., ‘Apparel Manufacturing Handbook’, 2nd Ed., Van Nostrand Reinhold, New   York, 1995   1. Carr, H. and Latham, B., ‘The Technology of Clothing Manufacture’, Wiley-Blackwell, 2009. 2. Stewart, B., Beverly Kemp- Gatterson, ‘Apparel Concepts and Practical Applications’, Fairchild New York, 2010 3. Fan, J., “Engineering Apparel Fabrics and Garments”, Wood Head Publishing Limited, 2012. 4. Burns. L. D., Bryant. N. G., ‘Business of Fashion – Designing, Manufacturing and Marketing,’ Fairchild New York, 2008. | | | | | |
| **Supplementary Readings:** | | | | | |
| weblinks, journal articles, conference proceedings book chapters etc | | | | | |

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| **DKTES Textile and Engineering Institute, Ichalkaranji**  **First Year M. Tech. (Semester – I)**  **01TEL534: Advanced Fabric Manufacturing** | | | | | | |
| Teaching Scheme:  Lectures: 03 Hrs./Week | | | Credits  03 | Evaluation Scheme:  SE 1: 25Marks  SE 2: 25Marks  SEE: 50Marks | | | |
| **Course Objectives:**   1. To study the effect of winding and warping process parameters on package quality 2. To describe the importance of automation and its impact on machine productivity, efficiency and quality of beam in Sizing department. 3. To explain design developments and process parameters during weaving on various components of Gripper Technology & fluid Technology shuttle- less technology. 4. To describe technical developments & machine details of knitting and Nonwoven machine | | | | | | | |
| **Course Outcomes:**  On completion of the course, student will be able to–   1. Analyze the winding and warping machine process 2. Explain the impact of automation on machine productivity and quality of sized beam 3. Describe the design developments of projectile, rapier and air jet looms 4. Explain the technical developments of knitting & Nonwoven machine including details of machine & process parameters | | | | | | |
| **Course Contents** | | | | | | |
| **Unit I** | | **Winding and Warping** | | | | **07 Hours** |
| Studies of research on over-end yarn unwinding from different ring bobbin specifications, Impact of yarn tension and drum design on package quality, Impact of yarn clearer on downstream and weaving process, Effect of splicer settings on yarn quality, Effect of various machine parameters on package quality. Analysis of the thread-tensioner working during the winding process, Effect of yarn hairiness reduction attachment on yarn properties, Effect of various modern machine design developments on machine productivity, Importance of automation and its impact on machine productivity, quality of package.  Relation between yarn package parameters and yarn tension during unwinding on warping machine, Mathematical Modelling of Yarn Tension at warping machine Creel, General study of various process parameters on beam quality, Effect of various modern machine design developments on machine productivity, Importance of automation and its impact on machine productivity, efficiency and quality of beam, Effect of Warping Speed and Warp Yarn Tension on yarn properties and loom performance, Effect of Warp Yarn Material and Cone position on Warping Creel on yarn properties, Studies on beam pressure, warping speed and tape length on end breaks, Concept of warping cum dyeing. | | | | | | |
| **Unit II** | | **Sizing** | | | | **07 Hours** |
| Importance of automation and its impact on machine productivity, efficiency and quality of beam, Effect of various modern machine design developments on machine productivity and quality, Various aspects of weavability of yarns, Different studies on various process parameters affecting stretch, sized yarn properties, weavability, sizing productivity, beam quality and loom performance, Concept of Sizing cum dyeing, Studies on optimization of various process parameters. | | | | | | |
| **Unit III** | | **Shuttle less Weaving (Gripper Technology)** | | | | **08 Hours** |
| Studies on warp cover factor, weft cover factor and warp tension on loom performance, effect of loom setting on fabric skewness. Comparative study of heald frame motion by rotary dobby and crank-cam shedding, effect of heald frame cross moment and initial warp tension on fabric properties, effect of shed geometry on loom performance and speed.  Studies on reed and its construction on fabric properties, effect of sley motion on beat up force. Studies on Weft velocity and parameters affecting it on Projectile loom, Study of shed geometry on projectile loom, Design of projectile for weft tension, Dynamic analysis of Projectile Picking Mechanism.  Studies on Weft velocity and parameters affecting it on Rapier loom, Study of shed geometry on rapier loom, Design of rapier for weft tension, Comparative studies on various rapier drives. | | | | | | |
| **Unit IV** | | **Shuttle less Weaving (Fluid Technology)** | | | | **06 Hours** |
| Studies of air flow and weft velocity on airjet loom, effect of various airjet loom setting parameters on air consumption and weavability limits, Analysis and Development of a Main and Relay Nozzle, effect of air and various weft yarn characteristics like, elastane: core spun; core twist (single en double) and air covered yarn on weft velocity Airjet loom, Effect of various loom parameter on weft break, Modern developments in relay nozzle and profile reed geometry and its effect on weft break/velocity. Back rest roll setting and its effect on fabric properties, theoretical aspects of back-rest roller rotation on weaving machine, comparative studies on 2D and 3D fabric structures. | | | | | | |
| **Unit V** | | **Knitting** | | | | **04 Hours** |
| Yarn tension effect on knitting machine and fabric quality, Effect of yarn count and stitch length on fabric properties, Evaluation and measurement of knittability, loop length effect on fabric with elastic yarn, various aspects of mechanics of loop formation on knitting machine, effect of yarn and machine setting on spirality, effect various machine parameters on fabric properties, Geometrical models of knitted structures, Modern design developments impact on process efficiency and fabric quality, Comparative studies on 2D and 3D fabric structures. | | | | | | | |
| **Unit VI** | **Nonwoven** | | | | **04 Hours** | | |
| Effect of various raw material and machine parameters on needle punched, hydro-entangled nonwoven fabrics, effect material variables on thermal bonding process, Studies on pore size distribution of nonwoven fabric, studies on cross layered needle punched fabrics, studies of nonwoven fabric engineering for special applications, Comparative studies on 2D and 3D fabric structures. | | | | | | | |
| **References Books:** | | | | | | | |
| 1 The unwinding of yarns from packages Part I: the theory of yarn-unwinding, V. K. Kothari & G. A. V. Leaf, Journal of Textile Institute 1979.  2 The unwinding of yarns from packages Part II: unwinding from cylindrical packages, V. K. Kothari & G. A. V. Leaf, Journal of Textile Institute 1979  3 Quality Parameters and Design Aspects of Warper’s Beam, Prof.Ashwin Thakkar, Prof. (Dr.) Someshwar Bhattacharya. International Journal on Textile Engineering and Processes, 2018.  4 Analysis of design aspects of textile warping: Part I: review of literature, Prof.Ashwin Thakkar et al. International Journal of Engineering Science and Technology, 2017.  5 Impact of process parameters on sizing machine performance – a review, Ranjit Turukmane, Sujit Gulhane, Rupesh B. Patil, Melliand International • May 2019  6 Effect of yarn stretch in sizing on loom performance, Mr. Dhananjay Devare, Prof. R.N. Turukmane, Prof. S. S. Gulhane & Mr.L.C. Patil, International Journal on Textile Engineering and Processes, 2016.  7 Effect of stretch on frequency distribution of breaking elongation of sized warp and their weavability, Indian Journal of Textile Research, 1986.  8 Simulation and optimization of warp tension in the weaving process Gloy YS, Renkens W, Herty M and Gries T, Journal of Textile Science and Engineering 2015.  9 Effect of fabric structural parameters and weaving conditions to warp tension of aramid fabrics for protective garments, Seung Jin Kim1 and Hyun Ah Kim, Textile Research Journal, 2017. | | | | | | | |

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| **DKTES Textile and Engineering Institute, Ichalkaranji**  **First Year M. Tech. (Semester – I)**  **01TEL535: Surface Treatment of Textiles** | | | | | | |
| Teaching Scheme:  Lectures: 03 Hrs./Week | | | Credits  03 | Evaluation Scheme:  SE 1: 25Marks  SE 2: 25Marks  SEE: 50Marks | | | |
| **Course Objectives:**   1. To explain the need and methodology of various surface modification techniques 2. To discuss physical and chemical aspects of coating, nano material, and plasma treatment. 3. To describe the changes brought in to textiles by surface modifications 4. To discuss the principles, methods of evaluation of modified textile surface | | | | | | | |
| **Course Outcomes:**  On completion of the course, student will be able to–   1. Explain need and methodology of various surface modification techniques 2. Describe the physical and chemical aspects of coating, nano material, and plasma treatment. 3. Illustrate the changes brought in to textiles by surface modifications. 4. Explain the principles, methods of evaluation of modified textile surface. | | | | | | |
| **Course Contents** | | | | | | |
| **Unit I** | | **Coating Chemistry** | | | | **07 Hours** |
| Advantages & Disadvantages of conventional finishing, Concept of Coating & Lamination, Merits & Demerits of Coating & Lamination, Production, Structure & Properties of Rubbers like- Natural Rubber, Styrene- Butadiene rubber, Isoprene-Isobutylene Rubber, Butyl Rubber, EPM & EPDM, Polychloroprene Rubber, Nitrile Butadiene Rubber & Silicone Rubber, Polymeric materials like Polyvinyl Chloride, Polyurethane, Acrylic Polymers, Foams for Laminates, Radiation-Cured Coating, Adhesion. | | | | | | |
| **Unit II** | | **Coating Techniques** | | | | **06 Hours** |
| Knife Coating- Different types of Knifes, Knife coating with pre-metering and post-metering, Roll Coating- Mayer rod coating, Direct-roll coating, Kiss roll coating, Gravure coating, Reverse roll coating, Dip Coating, Transfer Coating, Rotary screen Printing, Calendaring- Zimmer coating, Hot-Melt Coating, Scatter Coating, Foam Coating, Lamination by Adhesives, Flame Lamination, Hot melt Lamination Merits & Demerits of each coating methods. Test methods for coated, laminated materials. | | | | | | |
| **Unit III** | | **Nano Technology** | | | | **07 Hours** |
| Concept of nano-scale and historical background of nanotechnology, Fundamental concepts of nanotechnology - Bottom-up approaches, Top- down approaches, Functional approaches.  Synthesis and Properties of Nanoparticles: Synthesis of Fullerenes and various forms of carbon. Synthesis of nano metal particles by various chemical, physical and biological methods. Properties of nano particles like organic and inorganic materials in various chemical forms.  Characterization of Nanoparticles: Principles of various techniques. | | | | | | |
| **Unit IV** | | **Nano Textiles** | | | | **06 Hours** |
| Development of functional textile using nano material: Conductive textiles, antimicrobial textiles, Self-cleaning textiles, Moisture absorbing textiles, Improved hydrophilicity, colourability and wear resistance, UV- blocking textiles, Controlled release of active agents. | | | | | | |
| **Unit V** | | **Plasma Technology** | | | | **07 Hours** |
| Introduction, gases used, plasmas generation, plasma chemistry and plasma surface collisions. Low pressure, Atmospheric pressure and DBD plasma generation, its equipment for textile processing | | | | | | | |
| **Unit VI** | **Textile Applications of Plasma Technology** | | | | **08 Hours** | | |
| Action of plasma on various textile substrates. Plasma treatment of Textiles for water and soil repellency, Interfacial engineering of functional textiles for biomedical applications, plasma modification of wool, plasma modification of natural cellulosic fibres, plasma treatments of fibres and textiles. Characterization of Plasma Treated Textiles,  Principles of various techniques. | | | | | | | |
| **References Books:** | | | | | | | |
| 1 Principles of Nanotechnology by Phani Kumar  2 Nanofibres & Nanotechnology in Textiles by P.J. Brown & K. Stevens  3 Plasma Technology for Textiles by Roshan Shishoo, CRC Publication  4 Plasma Surface Modification and Plasma Polymerization – Norihiro Inagaki: CRC Press  5 Coated Textiles Principles and Applications by Dr. A. K. Sen  6 The Nanoscope, Encyclopedia of Nano Science & nanotechnology Vol.-I to VI, Dr. Parag Diwan & Ashish Bharadwaj  7 Analytical Electrochemistry in Textiles by P. Westbroek, G. Priniotakis & P. Kiekens | | | | | | | |
| **Supplementary Readings:** | | | | | | | |
| weblinks, journal articles, conference proceedings book chapters etc. | | | | | | | |

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| **DKTES Textile and Engineering Institute, Ichalkaranji**  **First Year M. Tech. (Semester – I)**  **01TEL536: Non-Woven Technology** | | | | | | |
| Teaching Scheme: Lectures: 03 Hrs./Week | | | Credits  03 | Evaluation Scheme:  SE 1: 25Marks  SE 2: 25Marks  SEE: 50Marks | | | |
| **Course Objectives:**   1. To explain the production flow chart of nonwovens and web forming techniques of nonwoven manufacturing 2. To describe the different bonding techniques to manufacture nonwoven fabrics. 3. To describe the concept of composite nonwovens and finishing of nonwovens 4. To explain the applications, testing and natural fibre nonwovens. | | | | | | | |
| **Course Outcomes:**  On completion of the course, student will be able to–   1. Describe the market size, scope and web forming techniques of nonwoven manufacturing. 2. Explain the different bonding techniques 3. Explain finishing of nonwovens and composite nonwovens 4. Illustrate the applications and explain the test methods and natural fibre nonwovens. | | | | | | |
| **Course Contents** | | | | | | |
| **Unit I** | | **Introduction** | | | | **03 Hours** |
| INDA, EDANA Non-woven definitions, flow chart of nonwoven manufacturing, different methods of nonwoven classifications, Market size, scope, advantages, disadvantages, Key companies. | | | | | | |
| **Unit II** | | **Web forming Techniques** | | | | **05 Hours** |
| **Dry-laid** web formation - Introduction, Selection of raw materials for carding, Carding: working and stripping principles, Cross-lapping, vertically lapped (perpendicular-laid) web formation.  **Air laid** web formation: raw materials and fibre preparation, Air laying technology.  **Wet-laid** web formation - Raw materials for wet-laid nonwoven, Cellulose fibre preparation, Man-made fibre preparation, Web-forming process technology, bonding systems for wet-laid nonwovens. | | | | | | |
| **Unit III** | | **Polymer-laid web formation** | | | | **06 Hours** |
| I. **Spun bond fabric production** - Spun bond production systems, Bonding techniques, Operating variables in the spun bond process, Structure, and properties of spun bond fabrics, Spun bond fabric applications.  II. **Melt blown fabric production** - Characteristics and properties of melt blown fabrics, Melt blown fabric applications, Mechanics of the spun bond and melt blown processes, other extrusion processes | | | | | | |
| **Unit IV** | | **Mechanical bonded** | | | | **08 Hours** |
| **Stitch bonded nonwovens** - Introduction, applications.  **Needle punching** - Introduction, Needle design and selection, Penetration depth and other factors affecting, Needle punching technology, properties of needle punched fabric  **Hydro entanglement** – Introduction, principles of hydro entanglement, Fibre selection for hydro entanglement, Hydro entanglement process technology, Process variables, properties of spun lace fabric.  **Thermal bonding**- Introduction, Principle of thermal bonding, Raw materials, Methods of thermal bonding.  **Chemical bonding** – Introduction, Chemical binder polymers, Mechanism of chemical bonding, Methods of binder application. | | | | | | |
| **Unit V** | | **Composite Nonwovens** | | | | **07 Hours** |
| Definition, Importance of composite nonwovens, Types of composite nonwovens, Composite nonwoven manufacturing processes, Application of composite nonwoven structures  Nonwoven fabric finishing: Introduction, Wet finishing, Application of chemical finishes, Lamination, Mechanical finishing, Surface finishing. | | | | | | | |
| **Unit VI** | **Applications** | | | | **07 Hours** | | |
| Applications of Nonwovens in apparel, agriculture, geotextiles, medical textiles, automotive textile & filtration.  Natural fiber nonwovens - Introduction, Cotton fiber nonwovens, Flax fiber nonwovens, Jute fiber nonwovens, Pineapple fiber nonwovens, Wool fiber nonwovens.  Characterization, testing of nonwoven fabrics. | | | | | | | |
| **References Books:** | | | | | | | |
| 1 Handbook of nonwovens, Edited by S. J. Russell, Wood head Publishing, CRC Press, Washington DC, 2007  2 Nonwovens: Process, structure, properties and applications, T. Karthik, R. Rathinamoorthy & C. Praba Karan, Wood head Publishing India Pvt. Ltd., 2016  3 Nonwoven Process Performance & Testing – Turbak  4 Proceedings of the Seminar - Nonwoven Technology Market & Product Potential, IIT, New Delhi December2006  5 W.Albrecht, H. Fuchs and W.Kettelmann, Nonwoven Fabrics: Raw Materials, Manufacture, Applications, Characteristics, Testing Process, 2003. | | | | | | | |
| **Supplementary Readings:** | | | | | | | |
| weblinks, journal articles, conference proceedings book chapters etc. | | | | | | | |

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| **DKTES Textile and Engineering Institute, Ichalkaranji**  **First Year M. Tech. (Semester – I)**  **01TED 552: Mini Project –I** | | | | |
| Teaching Scheme:  Practical: 07Hrs/Week | | Credits  07 | Evaluation Scheme:  CIE: 50Marks  SEE: 50Marks  TOTAL: 100Marks | | |
| **Course Objectives:**   * To identify the problem /idea and review and summarize the literature for the topic of the identified problem & to provide a platform to students to enhance their practical knowledge and skills * To describe the process flow for undertaking the research/survey trials with appropriate standards and process variables * To design, development, construction, and fabrication of innovative product/system for the final submission * To explain various tools of testing and statistical analysis for the data in order to draw relevant conclusions | | | | | |
| **Course Outcomes:**  On completion of the course, student will be able to–   * Describe the problem /idea and review and summarize the literature for the topic of the identified problem * Illustrate the suitable design of experiments including experimental plan. * Explain the concepts of design, development, construction, and fabrication of innovative product/system for the project title * Use various tools of testing and statistical analysis for the data in order to draw relevant conclusions | | | | |
| **Course Contents** | | | | |
|  | **Rationale** | | |  |
| The mini project will involve the design, development, construction, and fabrication of innovative product/system approved by the department. This is a laboratory oriented course which will provide a platform to students to enhance their practical knowledge and skills. Each student must keep a project notebook The notebooks will be checked periodically throughout the semester by the guide and also during the internal viva, as part of the project grade. | | | | |
|  | **Guidelines** | | |  |
| 1. Students should select a problem which addresses some textile industry problem, or other product developments in textiles. One mini project per semester per student.  2. The selected topic for mini project should be based on development/fabrication of innovative product which he/she learnt during course work.  3. Students should understand testing of various instruments relating to topic of mini project.  4. Execution of mini project should be carried out by students only under guidance of allotted faculty. One faculty per student.  5. Students should develop a necessary product with product specifications with reference to end use.  6. Students should see that final product submitted by them is in working condition.  7. 15-20 pages report to be submitted by students in prescribed guide lines. Presentation is for 10 minutes.  8. Group of students cannot be permitted to work on a single mini project. Individual student has to carry out mini project.  9. A demonstration and internal oral examination on the mini project also should be done at the end of the semester.  10. Department may arrange demonstration with poster presentation of all mini projects developed by the students at the end of semester.  11. It is desirable that the product developed by the students have some novel features.  12. A test of significance should be applied to the test results to ascertain the conformity of significant difference. | | | | |

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| **DKTES Textile and Engineering Institute, Ichalkaranji**  **First Year M. Tech. (Semester – II)**  **01TEL503: Project Preparation Appraisal and Implementation** | | | | |
| Teaching Scheme: Lectures: 03 Hrs./Week | | Credits  03 | Evaluation Scheme:  SE 1: 25Marks  SE 2: 25Marks  SEE: 50Marks | | |
| **Course Objectives:**   1. To explain the logic of project concept and its development cycle. 2. To describe in detail the technical analysis for raw material and utilities. 3. To illustrate the correlation of money and project preparation 4. To explain requirements for appraisal and project implementation | | | | | |
| **Course Outcomes:**  On completion of the course, student will be able to–   1. Describe the logic of Project development cycle & identification of Investment 2. Explain the Basics of Technical Analysis for Material inputs & utilities. 3. Explain the Time value of money and project preparation 4. Discuss the study on Appraisal criteria & Project implementation steps. | | | | |
| **Course Contents** | | | | |
| **Unit I** | **Overview** | | | **04 Hours** |
| Project development cycle, Objectives of investment, decision- making, Risk & return Identification of investment opportunities – Governmental regulatory framework – Generation & screening of project ideas – Project identifications for an existing company. | | | | |
| **Unit II** | **Market & demand analysis** | | | **08 Hours** |
| Information required for market & demand analysis – demand forecasting methods – market planning. Cost of Capital – Basic concepts – Cost of debt – cost of preference capital – cost of Equity Capital – Weighted average cost of capital – Marginal cost of capital-Cost of capital for a new company. | | | | |
| **Unit III** | **Technical Analysis** | | | **06 Hours** |
| Material inputs & utilities – Manufacturing process./ technology – Plant capacity – location & site – structures & civil works – Machineries & equipments – Project charts & layouts – Work schedule – Need for tendering alternatives. | | | | |
| **Unit IV** | **Financial Analysis** | | | **06 Hours** |
| Cost of Project – Means of finance – Estimation of Sales & Production – Cost of production – Working capital requirement & financing – Profitability projections – Breakeven point – Project cost flow statements – Projected balance sheet – Multi – year projection. | | | | |
| **Unit V** | **Time value of money** | | | **08 Hours** |

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| Future value of single amount, Future value of an annuity –Present value of single amount – Present value of an annuity. Analysis of Risk – Types & measurement of project risk – Analytical derivation or simple estimation – Sensitivity Analysis – Scenario analysis –Selection of a project-Risk analysis in practice. | | | |
| **Unit VI** | | **Appraisal criteria** | **06 Hours** |
| Urgency, Payback period – Accounting, Debt service coverage ratio, Rate of Return, Net present value – Internal rate of return – Annual capital charge – Investment appraisal in practice. Project implementation – Forms of project organization – Project planning – project control – Human aspects of project management – Prerequisites for successful project implementation. | | | |
| **References Books:** | | | |
| 1 Textile Project Management by A. Ormerod, The Textile Institute Publication.  2 Goal Directed Project Management by E.S. Andersen, K.V. Grude & Tor Hang, Coopers & Cybranl Publication.  3 Project, Planning Analysis, Selection Implementation & Review by Prasanna Chandra, Tata McGraw Hill Publishing Co. Ltd.,  4 Industrial Organization & Engineering. Economics T.R. Banga & S.C. Sharma, Khanna Publishers, Delhi.  5 Marketing Management by Philp Kotler. | | | |
| **Supplementary Readings:** | | |
| weblinks, journal articles, conference proceedings book chapters etc. | | |

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| **DKTES Textile and Engineering Institute, Ichalkaranji**  **First Year M. Tech. (Semester – II)**  **01TEL504: Fibre Reinforced Composites** | | | | | | |
| Teaching Scheme  Lectures: 03 Hrs./Week | | | Credits  03 | Evaluation Scheme:  SE 1: 25Marks  SE 2: 25Marks  SEE: 50Marks | | | |
| **Course Objectives:**   1. To explain requirements of fibre and matrix for composite fabrication & their types 2. To describe the fibre-matrix interactions in unidirectional lamina. 3. To explain details of various methods of composite fabrication 4. To explain properties of composites and their applications | | | | | | | |
| **Course Outcomes:**  On completion of the course, student will be able to–   1. Describe the logic, need, requirements of composites based on end use 2. Explain the manufacturing of the composites and fibre used for fabrication. 3. Evaluate the performance of composites including fibre matrix interactions 4. Discuss the applications of composites | | | | | | |
| **Course Contents** | | | | | | |
| **Unit I** | | **Fibers and matrices** | | | | **10 Hours** |
| **General introduction** - Meaning and types of composite materials, design of composite materials, the concept of load transfer.  **Fibers and matrices**  Reinforcements - carbon fibers, glass fibers, organic fibers, silicon carbide, Strength of reinforcements: thermal stability, compressive strength, fiber fracture and flexibility, A statistical treatment of fiber strength.  Matrices - polymer matrices, metal matrices, ceramic matrices.  Fiber architecture - Volume fraction and weight fraction, fiber packing arrangements, clustering of fibers and particles.  Long fibers - laminates, woven, braided and knitted fabric arrays, characterization of fiber orientations in a plane.  Short fibers - fiber orientation distributions in three dimensions, fiber length distributions. | | | | | | |
| **Unit II** | | **Fabrication** | | | | **04 Hours** |
| Liquid resin impregnation routes, pressurized consolidation of resin pre-pregs, injection mouldings of thermoplastics, hot press mouldings of thermoplastics, powder blending and consolidation, physical vapour deposition diffusion bonding of foils, Layered ceramic composites, reactive processing, carbon/carbon composites, powder based routes. | | | | | | |
| **Unit III** | | **The interface region** | | | | **08 Hours** |
| Bonding mechanisms: absorption and wetting, inter diffusion and chemical reaction, electrostatic attraction, mechanical keying, residual stresses.  Bond strength: Measurements of bond strength: single fiber pull out strength, single fiber push out and push down strength.  Control of bond strength: coupling agents and environmental effects, toughness reducing coatings, interfacial chemical reaction and diffusion barrier coatings. | | | | | | |
| **Unit IV** | | **Strength of composites** | | | | **06 Hours** |
| Failure mode of long fibers like axial tensile failure, transverse tensile failure, shear failure, failure in compression.  Failure of laminae under off-axis loads. Strength of laminates like tensile cracking, interlaminar stresses and edge effects.  Basic concepts of fracture mechanics, interfacial fracture and crack deflection.  Contributions to work of fracture like Matrix deformation, fiber fracture, interfacial debonding and frictional sliding.  Subcritical crack growth like fatigue and stress corrosion cracking. | | | | | | |
| **Unit V** | | **Thermal behavior of composites** | | | | **06 Hours** |
| Thermal stresses and strains, thermal expansivities, thermal cycling of unidirectional composites, thermal cycling of laminates, basics of matrix and fiber in relation to creep, axial creep of long fiber composites, transverse creep and discontinuously reinforced composites.  Thermal conduction mechanism like heat transfer, conductivity of composites and interfacial thermal resistance. | | | | | | | |
| **Unit VI** | **Applications** | | | | **02 Hours** | | |
| Minesweeper hull, sheet processing rolls, helicopter rotor blade, and golf driving club, racing bicycle, diesel engine piston, microelectronics housing, aircraft brakes and gas turbine combustor can. | | | | | | | |
| **References Books:** | | | | | | | |
| 1 Introduction to Composite Materials, Clyne and Hull  2 Fabre reinforced composites by P. K. Mallick  3 Composite materials: Engineering & science by F. L. Mathew & R. D. Rawlings.  4 Micro structural Characterization of fibre reinforced composites by John Summerscales  5 3-D Textile reinforcements in composite materials by Prof. A. Miravete  6 Mechanics of Textile & Laminated composites by A. E. Bogdanovich & C. M. Pastore. | | | | | | | |
| **Supplementary Readings :** | | | | | | | |
| weblinks, journal articles, conference proceedings book chapters etc. | | | | | | | |

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| **DKTES Textile and Engineering Institute, Ichalkaranji**  **First Year M. Tech. (Semester – II)**  **01TEL553: Design of Experiments and Statistical Application in Textile** | | | | | | |
| Teaching Scheme: Lectures: 03 Hrs./Week | | | Credits  03 | Evaluation Scheme:  SE 1: 25Marks  SE 2: 25Marks  SEE: 50Marks | | | |
| **Course Objectives:**   1. To solve problems of LPP. 2. To solve problems of transportation and assignment problem. 3. To solve problems of one-way, two-way ANOVA 4. To solve problems of CRD, RBD, LSD and factorial experiments | | | | | | | |
| **Course Outcomes:**  On completion of the course, student will be able to–   1. Describe LPP, types and methods of finding solutions, transportation problem & method of finding optimum solution. 2. Explain Assignment Problem, method of finding optimum solution, PERT and CPM networks & Calculation of Slack and float time estimates. 3. Discuss analysis of variance, types, and method of solution 4. Explain DOE, basic designs, and analysis. Explain Yate's method of Solution | | | | | | |
| **Course Contents** | | | | | | |
| **Unit I** | | **Linear Programming Problems** | | | | **07 Hours** |
| Definition and formulation of LPP. Max. & Min type of LPP. Solution of LPP by graphical and Simplex methods. | | | | | | |
| **Unit II** | | **Transportation and Assignment Problems** | | | | **08 Hours** |
| Definition of transportation problem. North West corner rule, Matrix Minima Method and Vogel Approximation Method for finding initial solution. UV Method for finding optimum solution. Definition of Assignment Problem and Hungarian method of finding optimum solution. | | | | | | |
| **Unit III** | | **Network Analysis** | | | | **05 Hours** |
| Network drawing. PERT and CPM networks. Calculation of slack and float times. | | | | | | |
| **Unit IV** | | **Analysis of variance** | | | | **04 Hours** |
| Introduction, One-way and Two-way as types, analysis, and conclusion by preparing ANOVA table. | | | | | | |
| **Unit V** | | **Design of Experiments** | | | | **06 Hours** |
| Introduction, basic principles, basic designs CRD, RBD and LSD. Analysis of these designs. | | | | | | | |
| **Unit VI** | **Factorial Experiments** | | | | **06 Hours** | | |
| Introduction, two factor two and three level designs. Analysis using Yate's method. | | | | | | | |
| **References Books:** | | | | | | | |
| 1 Modern Elementary Statistics by J. Fruend.  2 Mathematical Statistics by J. Fruend.  3 Probability & Statistics for engineers by Johnson  4 Applied Statistics & probability for engineers by Montgomery.  5 Experimental Designs by Cochran & Cox  6 Modern Elementary Statistics by J. Fruend. | | | | | | | |
| **Supplementary Readings :** | | | | | | | |
| weblinks, journal articles, conference proceedings book chapters etc. | | | | | | | |

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| **DKTES Textile and Engineering Institute, Ichalkaranji**  **First Year M. Tech. (Semester – II)**  **01TEL537: Finishing and Quality Evaluation of Apparels** | | | | | | |
| Teaching Scheme: Lectures: 03 Hrs./Week | | | Credits  03 | Evaluation Scheme:  SE 1: 25Marks  SE 2: 25Marks  SEE: 50Marks | | | |
| **Course Objectives:**   1. Discuss finishing of fabric and garments: need, principles and chemistry involved 2. Discuss evaluation methods and analysis of results for colour fastness, functional finishes, and care label 3. Enumerate environmental issues with garments and discuss its evaluation 4. Discuss principle, working and results interpretation of instrumental evaluation in eco-testing | | | | | | | |
| **Course Outcomes:**  On completion of the course, student will be able to –   1. Explain finishing of fabric and garments: need, principles and chemistry involved. 2. Explain evaluation methods and analysis of results for colour fastness, functional finishes, and care label 3. Enumerate environmental issue with garments and discuss its evaluation 4. Explain principle, working and result interpretation of instrumental evaluation in eco-testing | | | | | | |
| **Course Contents** | | | | | | |
| **Unit I** | | **Finishing of fabric** | | | | **07 Hours** |
| Softeners: Mechanism, types and chemistry of softeners, compatibility. Hand builders: types and chemistry of hand builders.  Resin finish: mechanism, formaldehyde issues, eco-friendly alternatives, concept of wet and moist curing.  Concept, mechanism and application of UV protection finish,  Antimicrobial finish, flame retardant finish, soil release finish. | | | | | | |
| **Unit II** | | **Finishing of Garments** | | | | **06 Hours** |
| Essential physical and functional requirement of garments like handle, drape, hydro-philicity and -phobicity etc.  Optics of denim, processing of denim garments and various wash down effects; cationization and pigment dyeing, bio-finishing of cellulosic garments. | | | | | | |
| **Unit III** | | **Evaluation of Functional Finishes** | | | | **05 Hours** |
| Importance and principle of evaluation of functional finishes like durable press rating, flammability, soil release, anti-microbial and sun protection. | | | | | | |
| **Unit IV** | | **Colour fastness and Care Label** | | | | **08 Hours** |
| Introduction: importance of testing, sample preparation, acceptance sampling, errors and standardization.  Need, principle, method and result interpretation for colour fastness to various agencies like washing, crock, light, perspiration, bleaching, dry cleaning, sublimation, saliva, chlorinated and sea water, ozone etc.  Care label: voluntary and mandatory care label, Care label symbols. Instructions for washing, bleaching, drying, ironing, dry cleaning, and placement of care label. | | | | | | |
| **Unit V** | | **Eco aspects** | | | | **06 Hours** |
| Concepts of Eco-Testing of Textiles; Principles of evaluation of Banned amines, Formaldehyde, PCP, heavy metals and restricted chemicals. Sources of hazards chemicals and acceptance norms. Certifications like Okö-tex, Organic cotton, GOTS and restricted chemicals. | | | | | | | |
| **Unit VI** | **Instruments** | | | | **08 Hours** | | |
| Classification of chromatographic methods, Principle and working and application of HPLC, GCMS;  Concept, laws, instrument and working principle of UV – Visible spectroscopy Instruments, working principle and result interpretation of NMR, FTIR, XRD and AAS. | | | | | | | |
| **References Books:** | | | | | | | |
| 1 Textile Physics by B P Savili  2 AATCC and ISO Standards Manual  3 Textile Finishing by Scholinger  4 Fabric Care by Naomi D’soza  5 Testing of Eco-Parameters by S Subramanian, Anita hazara; Textile Committee  6 Elementary Organic spectroscopy – Principles and Chemical Application by Y R Sharma | | | | | | | |
| **Supplementary Readings :** | | | | | | | |
| weblinks, journal articles, conference proceedings book chapters etc. | | | | | | | |

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| **DKTES Textile and Engineering Institute, Ichalkaranji**  **First Year M. Tech (Textile Engineering) (Semester – II)**  **01TEL538: INDUSTRIAL ENGINEERING** | | | | | | |
| Teaching Scheme: Lectures: 03 Hrs./Week | | Credits  03 | Evaluation Scheme:  SE- 1: 25Marks  SE- 2: 25Marks  SEE: 50Marks | | | |
| **Course Objectives:**   1. To understand the importance of Industrial Engineering. 2. To discuss the factors affecting Production Planning and Control and inventory. 3. To understand Ergonomics and costing, overheads. 4. To Formulate of mathematical model and problem solving | | | | | | |
| **Course Outcomes:**  At the end of the course, students will be able to   1. Explain the concepts of Industrial Engineering. 2. Identify the factors affecting Production, Planning and Control of inventory. 3. Solve the problems based on Ergonomics and costing, overheads. 4. Formulate mathematical model and problem solving. | | | | | | |
| **Course Contents** | | | | | | |
| **Unit I** | **Work study and operational research** | | | | **08 Hours** | |
| **Work Study and Productivity**- Production – Definition, Types of production, and characteristics of each type of production. Productivity, ways to increase productivity, measurement of productivity.  **Method Study**-Definition, steps in method study, details of every step, charts used for recording, outline chart, flow process chart & its types, two handed process chart, multiple activity chart, principles of motion economy,  **Micro motion Study** – Contribution of Gilbreth, Therblings, Procedure, SIMO Chart. c Work measurement Definition, Techniques, concept of total time, standard time, allowances, problems  **Operation Research** – Definition, various techniques of OR. Basics of linear programming – Formulation of LP, Graphical solution, | | | | | | |
| **Unit II** | **Production, Planning & Control** | | | | **08 Hours** | |
| **Production, Planning & Control (PPC)-** objectives, functions. Forecasting- various techniques of sales forecasting,  **Capacity Planning-** Strategic decisions, measurements, influences, translating capacity into workable units.  **Process Planning-** inputs, factors, steps, route sheets, planning in different situations.  **Scheduling**- sequencing, scheduling, Gantt charts  **Project Planning-** Network Analysis – PERT, CPM, and comparison. g Plant location, Plant layout, Material handling. | | | | | | |
| **Unit III** | **Material Planning** | | | | **06 Hours** | |
| **Material Plannin**g- Factors, Techniques, BOM, MRP, Inventory  Control- objectives, selective inventory control, EOQ, EBQ, safety stock, Replenishment systems. | | | | | | |
| **Unit IV** | **Ergonomics** | | | | **06 Hours** | |
| **Ergonomics:** Introduction, areas of study under ergonomics, system approach to ergonomics model, man-machine system. Components of man-machine system and their functions – work capabilities of industrial worker, study of development of stress in human body and their  consequences. Computer based ergonomics. | | | | | | |
| **Unit V** | **Overheads** | | | | **06 Hours** | |
| **Overheads:** Classification, collection of overheads, Primary and Secondary apportionment of overheads, absorption of overheads- Machine hour and labour hour rate. Under and over absorption of overheads. | | | | | |
| **Unit VI** | **Costing** | | | **04 Hours** | |
| **Costing:** Methods of costing and elements of cost.  **Material Cost-** Different methods of pricing of issue of materials.  **Labour Cost** -Different methods, wages and incentive plans. Principles of good remunerating system, labour turnover.  **Depreciation Concept**, -importance and different methods of depreciation | | | | | |
| **References Books:** | | | | | |
| 1. Introduction to work study-ILO, - III Revised Edition, 1981 | | | | | |
| 1. Motion and Time study “- Ralph M Barnes; John Wiley, 8th Edition, 1985. | | | | | |
| 1. Work Study and Ergonomics “- S Dalela and Sourabh, Chand Publishers, 3rd edition. | | | | | |
| 1. Work Study - Ralph & Barnes. | | | | | |
| 1. “Engineered work Measurement” - Weldon, ELBS, Marvin E. Mundel- Motion and Time   study, PHI, 1st edition, 1991. | | | | | |
| 1. B K Bhar, “Cost Accounting – Methods and Problems”, Academic Publishers | | | | | |
| 1. Bhattacharya A. K., “Principles and Practice of Cost Accounting”, Prentice Hall India. | | | | | |
| 1. Colin Drury, “Management and Cost Accounting”, English Language Book Society,   Chapman and Hall London. | | | | | |
| **Supplementary Readings:** | | | | | |
| Weblinks, journal articles, conference proceedings book chapters etc. | | | | | |

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| **DKTES Textile and Engineering Institute, Ichalkaranji**  **First Year M. Tech. (Textile Engineering) (Semester – II)**  **01TEL539: Nanofibers and Nanotechnology in Textiles** | | | | | |
| Teaching Scheme: Lectures: 03 Hrs. /Week | | Credits  03 | Evaluation Scheme:  SE 1: 25 Marks  SE 2: 25 Marks  SEE: 50 Marks | | |
| **Course Objectives:**   1. To explain requirements of nanotechnology in textiles 2. To explain Electrospinning of Nanofibers & Nanocomposites 3. To describe the Synthesis and Properties of Nanoparticles 4. To explain the Characterization of Nanoparticles | | | | | |
| **Course Outcomes:**  At the end of the course, students will be able to   1. Understand the importance of nanotechnology in textiles. 2. Do electrospinning of nanofibers for different types of polymers. 3. Do synthesis of nanoparticles and nanoengineered compounds by physical, chemical, and biological routes. 4. Carry out characterization of nanoparticles | | | | | |
| **Course Contents** | | | | | |
| **Unit I** | **Introduction to Nanotechnology** | | | | **04 Hours** |
| Concept of nanoscale and Historical background of nanotechnology, Fundamental concepts of nanotechnology - Bottom-up approaches, Top-down approaches, Functional approaches. | | | | | |
| **Unit II** | **Manufacturing of Nanofibres** | | | | **08 Hours** |
| Principles of electrostatic atomization, Electro spraying and electrospinning by the capillary method, Electro spraying and Electrospinning by the charge injection method, controlling fiber orientation, producing noncontinuous or short yarns, Producing continuous yarns. Various applications of nanofibres viz, tissue engineering, filter media. | | | | | |
| **Unit III** | **Synthesis and Properties of Nanoparticles** | | | | **08 Hours** |
| Synthesis of Fullerenes and various forms of carbon. Synthesis of nano metal particles by various chemical, physical, and biological methods. Properties of nano particles like organic and inorganic materials in various chemical forms. | | | | | |
| **Unit IV** | **Nanocomposites** | | | | **05 Hours** |
| Carbon nanotube / nanofiber polymer composites, development of functional polymer nanocomposites, Nano filled polypropylene nanocomposites and Dyeable PP. | | | | | |
| **Unit V** | **Nanoengineered Textiles** | | | | **08 Hours** |
| Nanolayer deposition/coating of polymer films through viz. grafting, plasma and self-assembled for various applications like Conductive textiles, antimicrobial textiles, Self-cleaning textiles, Moisture absorbing textiles, Improved hydrophilicity, colourability and wear resistance, UV- blocking textiles, Controlled release of active agents. | | | | | |
| **Unit VI** | **Characterization of Nanoparticles** | | | **06 Hours** | |
| X-Ray Diffraction, Transmission Electron Microscopy and Spectroscopy; Scanning electron microscopy (SEM); Transmission electron microscopy (TEM); Energy-dispersive x-ray spectroscopy (EDS), Small-Angle X-Ray Scattering (SAXS), The Cone Calorimeter (CC), The Mass Loss Calorimeter (MLC). | | | | | |
| **Reference Books:** | | | | | |
| 1. Principles of Nanotechnology by Phani Kumar 2. Nanofibres & Nanotechnology in Textiles by P.J. Brown & K. Stevens. 3. The Nano scope, Encyclopedia of Nano Science & nanotechnology Vol.-1 to VI, Dr. Parag Diwan& Ashish Bharadwaj. 4. Nano finishing of Textile Materials by Majid Montazer Tina Harifi, The Textile Institute Book Series 5. Nanoparticle Technology Handbook, Edited by Masuo Hosokawa, Kiyoshi Nogi, MakioNaito, Toyokazu Yokoyama 6. Nanosols and Textiles by Boris Mahltig, Torsten Textor 7. Nanoscale Science and Technology Edited by Robert W. Kelsall, Ian W. Hamley, Mark Geoghegan, 8. Nanotechnology Health and Environmental Risks, Editor Jo Anne Shatkin | | | | | |
| **Supplementary Readings:** | | | | | |
| weblinks, journal articles, conference proceedings book chapters etc. | | | | | |

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| **DKTES Textile and Engineering Institute, Ichalkaranji**  **First Year M. Tech. (Semester – II)**  **01TEL540: Theory of Clothing Comfort** | | | | | | |
| Teaching Scheme: Lectures: 03 Hrs./Week | | | Credits  03 | Evaluation Scheme:  SE 1: 25Marks  SE 2: 25Marks  SEE: 50Marks | | | |
| **Course Objectives:**   1. To define ‘comfort’ 2. To discuss the mechanism of thermal comfort. 3. To explain fabric characteristics and tactile attributes 4. To explain the ways to improve the clothing | | | | | | | |
| **Course Outcomes:**  On completion of the course, student will be able to –   1. Describe ‘comfort’. 2. Explain the mechanism of thermal comfort. 3. Explain fabric characteristics and tactile attributes 4. Explain the ways to improve the clothing | | | | | | |
| **Course Contents** | | | | | | |
| **Unit I** | | **Human Physiology And Role of Clothing** | | | | **06 Hours** |
| Definition of Comfort. Human physiological aspect of comfort. Perception of Comfort. Various aspects of clothing comfort. Comfort variables. Comfort properties of fibres, yarns and fabric structures. | | | | | | |
| **Unit II** | | **Thermal Comfort** | | | | **06 Hours** |
| Thermal balance of human body. Mechanism of heat transfer through clothing. Parameters influencing heat transfer. Mathematical modeling of heat transfer through clothing. Moisture transmission: Liquid water transfer- wicking, water absorption and principles of moisture vapour transfer. Dynamic heat and mass transmission characteristics of clothing.  Factors influencing heat and mass transfer through fabrics. | | | | | | |
| **Unit III** | | **Tactile Comfort** | | | | **06 Hours** |
| Tactile comfort sensations. Fabric characteristics and tactile attributes. Fabric parameters influencing tactile sensation | | | | | | |
| **Unit IV** | | **Clothing Fit and Comfort** | | | | **06 Hours** |
| Body dimensions and pattern. Tight-fit and loose-fit clothing. Clothing fit and pressure. Factors related to clothing fit. Clothing fit and body movement. | | | | | | |
| **Unit V** | | **Aesthetic Comfort** | | | | **06 Hours** |
| Psychological aspects of aesthetic comfort. Analysis of clothing aesthetics. Aesthetic concepts of clothing. | | | | | | | |
| **Unit VI** | **Improving Comfort in Clothing** | | | | **06 Hours** | | |
| Different approaches for improving thermal comfort of clothing. Improving moisture transport and developments in moisture management. Improving textile surface properties for tactile sensation. Materials and design strategies for improved fit and movement. | | | | | | | |
| **References Books:** | | | | | | | |
| 1 Guowen Song, “Improving Comfort in Clothing”, Woodhead Publishing Limited, Cambridge, 2011  2 Apurba Das and Alagirusamy R, “Science in Clothing Comfort”, Wood head Publishing India Limited, New Delhi, 2010  3 Li Y, “The Science of Clothing Comfort”, Textile Progress, Vol.31, No.1/2, The Textile Institute, Manchester, 2001  4 Fan J and Hunter L, “Engineering Apparel Fabrics and Garments “, Woodhead Publishing Limited, Cambridge, 2009 | | | | | | | |
| **Supplementary Readings:** | | | | | | | |
| weblinks, journal articles, conference proceedings book chapters etc. | | | | | | | |

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| **DKTE Society’s Textile and Engineering Institute, Ichalkaranji**  **First Year M. Tech. – Textile Engineering (Semester – II)**  **01TEL541: 3D TEXTILES** | | | | | | |
| Teaching Scheme: Lectures: 03 Hrs./Week | | Credits 03 | Evaluation Scheme:  SE 1: 25 Marks  SE 2: 25 Marks  SEE: 50 Marks | | | |
| **Course Objectives:**  1. To explain the concept and range of 3D textiles.  2.To describe the three-dimensional woven and knitted textiles.  3. To explain the three-dimensional braiding technology and 3D nonwoven fabrics.  4. To describe the applications of 3D textiles. | | | | | | |
| **Course Outcomes:**  At the end of the course, students will be able to  1.Explain the concept and range of 3D textiles.  2. Describe the three-dimensional woven and knitted textiles.  3. Explain the three-dimensional braiding technology and 3D nonwoven fabrics.  4. Describe the applications of 3D textiles. | | | | | | |
| **Course Contents** | | | | | | |
| **Unit I** | **Introduction** | | | | **04 Hours** | |
| Definition of 3D textiles, concepts of 3D textiles, limitations of 2D textile structures, range of 3D textiles like woven, knits, braids, other yarn structures, nonwovens, stitched and embroidered, draping and press-forming, etc., comparison of 3D with 2D fabrics, classification of 3D woven fabrics. | | | | | | |
| **Unit II** | **Solid & Hollow Three-Dimensional Woven Textiles** | | | | **08 Hours** | |
| Solid three-dimensional woven textiles: - Demand of 3D woven fabrics and composites, Major technical challenges, 3D multilayer weaving, 3D woven Versus nonwoven fabrics, Manufacture of multilayer woven fabrics, General structure and behavior of multilayer woven fabrics, applications of multilayer woven fabrics.  Hollow three-dimensional woven fabrics: - Overview and potential applications, principles of hollow woven fabrics, properties and performance of structures based on hollow woven fabrics, possible applications. | | | | | | |
| **Unit III** | **Shell & Nodal Three-Dimensional Woven Textiles** | | | | **08 Hours** | |
| Shell three-dimensional woven textiles: - Introduction, reasons for the development of weaving processes for 3D shells, History & classification, flat woven and unfolded double layer fabrics, shell creation by alternating thread spacings, weave design and patterns of 3D woven shells, CAD, and simulation of 3D woven shells.  Nodal three-dimensional woven textiles: - Introduction, Nodal 3D structures, Nodal 3D design and production parameters, applications. | | | | | | |
| **Unit IV** | **Three-Dimensional Knitted Textiles** | | | | **04 Hours** | |
| Introduction, 3D knitting technologies, 3D knitted structures like tubular structures, net-shape structures, spacer structures, etc., Properties and applications. | | | | | | |
| **Unit V** | **3D Braiding Technology & 3D Nonwoven Fabrics** | | | | **06 Hours** | |
| Introduction, 3D braiding, 3D nonwoven fabric, Developments in 3D nonwovens. | | | | | |
| **Unit VI** | **Applications of 3D Textiles** | | | **06 Hours** | |
| 3D woven preforms for E-textiles and composites reinforcements, 3D textile reinforced composites for the transportation industry, Three-dimensional textiles in the automotive industry, aerospace industry. Three-dimensional fabrics as medical textiles, Three-dimensional textile for protective clothing, sports and recreational clothing, geotextiles. | | | | | |
| **References Books:** | | | | | |
| |  | | --- | | 1. 3D fibrous assemblies by Jinlian HU  2. Advances in 3D Textiles by Xiaogang Chen  3. 3D textile reinforcements in composite materials by Prof. Antonio Miravete | | | | | | |
| **Supplementary Readings:** | | | | | |
| weblinks, journal articles, conference proceedings book chapters etc. | | | | | |

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| **DKTES Textile and Engineering Institute, Ichalkaranji**  **First Year M. Tech. (Semester – II)**  **01TEL542: Mechanics of Textile Machines** | | | | | | |
| Teaching Scheme: Lectures: 03 Hrs./Week | | | Credits  03 | Evaluation Scheme:  SE 1: 25Marks  SE 2: 25Marks  SEE: 50Marks | | | |
| **Course Objectives:**   1. To understand basic principles of mechanics, forces acting in mechanisms of textile machines 2. To describe constructional details and design aspects of machine parts and mechanisms involved in machines. 3. To evaluate design performance parameters involved in mechanisms 4. To select criterion and selection process for mechanisms as per need | | | | | | | |
| **Course Outcomes:**  On completion of the course, student will be able to –   1. Explain principles of mechanics, forces acting in mechanisms of textile machines 2. Express design aspects of machine parts and mechanisms involved in machines. 3. Evaluate design performance parameters involved in mechanisms 4. Select mechanisms as per need of textile machines. | | | | | | |
| **Course Contents** | | | | | | |
| **Unit I** | | **Fundamentals of mechanics** | | | | **06 Hours** |
| Equations of forces, motion, and energy; energy stored in rotating masses, simple harmonic motion its application to sley motion & heald shaft movement. | | | | | | |
| **Unit II** | | **Design of machine elements** | | | | **06 Hours** |
| forces acting on components, stress strain curve, factor of safety, design steps, combined stresses, design of drafting rollers & shaft. | | | | | | |
| **Unit III** | | **Friction & Lubrication** | | | | **06 Hours** |
| Machine degradation, factors & impact, meaning of lubrication, types of lubricants, selection criteria, lubricant monitoring. | | | | | | |
| **Unit IV** | | **Vibration monitoring** | | | | **06 Hours** |
| types of machine vibrations, impact of vibration, natural frequency of vibration, important vibration characteristics, vibration monitoring programme, materials & methods to control vibrations. | | | | | | |
| **Unit V** | | **Mechanics in yarn manufacturing processes** | | | | **06 Hours** |
| Elimination of trash & dust, carding theories, transfer of fibres, doubling & drafting, drafting force, design of cone drums, tension variation in roving, spinning geometry, balloon tension, cop winding, friction & open end spinning | | | | | | | |
| **Unit VI** | **Mechanics in fabric manufacturing processes** | | | | **06 Hours** | | |
| Study of mechanisms in winding, Build of various packages. Screw traversing mechanism. Design of grooved drums for various packages. Design changes in Beam warping drive for high speed. Sectional warping drum design. Mechanism of squeezing, sow box design. Review of design changes of shedding mechanism. Picking mechanism theories for different shuttle less weaving techniques. | | | | | | | |
| **References Books:** | | | | | | | |
| 1 Textile Mathematics, Vol-I, II and III By J.E. Booth, The Textile Institute Publication.  2 Control Methodology in Textile Engineering and Economics By John W.s. Hearle, Journal of the Textile Inst. Vol.83, No.3, 1992, The Textile Institute Publication  3 Textile Mechanics Vol.I, II By K. Slater, The Textile Institute Publication.  4 Mechanics of Spinning Machines By R.S. Rengasamy, NCUTE Publication  5 An Introduction to Textile Mechanisms By P. Grosberg, The General Publishing Company.  6 Theory of Machines by Sharma Agarwal  7 Mechanics of Textile Machinery By W.A.Hanton, The Textile Institute, Publication.  8 Principles of Weaving By R.Marks & Robbinson | | | | | | | |
| **Supplementary Readings :** | | | | | | | |
| weblinks, journal articles, conference proceedings book chapters etc | | | | | | | |

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| **DKTES Textile and Engineering Institute, Ichalkaranji**  **First Year M. Tech. (Semester – II)**  **01TED 554: Mini Project –II** | | | | |
| Teaching Scheme: Practical: 07Hrs/Week | | Credits  07 | Evaluation Scheme:  CIE: 50Marks  SEE: 50Marks  TOTAL: 100Marks | | |
| **Course Objectives:**   1. To identify the problem /idea and review and summarize the literature for the topic of the identified problem & to provide a platform to students to enhance their practical knowledge and skills 2. To describe the process flow for undertaking the research/survey trials with appropriate standards and process variables 3. To design, development, construction, and fabrication of innovative product/system for the final submission 4. To explain various tools of testing and statistical analysis for the data in order to draw relevant conclusions | | | | | |
| **Course Outcomes:**  On completion of the course, student will be able to–   1. Describe the problem /idea and review and summarize the literature for the topic of the identified problem 2. Illustrate the suitable design of experiments including experimental plan. 3. Explain the concepts of design, development, construction, and fabrication of innovative product/system for the project title 4. Use various tools of testing and statistical analysis for the data in order to draw relevant conclusions | | | | |
| **Course Contents** | | | | |
|  | **Rationale** | | |  |
| The mini project will involve the design, development, construction, and fabrication of innovative product/system approved by the department. This is a laboratory-oriented course which will provide a platform to students to enhance their practical knowledge and skills. Each student must keep a project notebook The notebooks will be checked periodically throughout the semester by the guide and also during the internal viva, as part of the project grade. | | | | |
|  | **Guidelines** | | |  |
| 1. Students should select a problem which addresses some textile industry problem, or other product developments in textiles. One mini project per semester per student.  2. The selected topic for mini project should be based on development/fabrication of innovative product which he/she learnt during course work.  3. Students should understand testing of various instruments relating to topic of mini project.  4. Execution of mini project should be carried out by students only under guidance of allotted faculty. One faculty per student.  5. Students should develop a necessary product with product specifications with reference to end use.  6. Students should see that final product submitted by them is in working condition.  7. 15-20 pages report to be submitted by students in prescribed guide lines. Presentation is for 10 minutes.  8. Group of students cannot be permitted to work on a single mini project. Individual student has to carry out mini project.  9. A demonstration and internal oral examination on the mini project also should be done at the end of the semester.  10. Department may arrange demonstration with poster presentation of all mini projects developed by the students at the end of semester.  11. It is desirable that the product developed by the students have some novel features.  12. A test of significance should be applied to the test results to ascertain the conformity of significant difference. | | | | |

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| **DKTES Textile and Engineering Institute, Ichalkaranji**  **Second Year M. Tech. (Semester – III)**  **01TED601: Dissertation Phase I** | | | | |
| Teaching Scheme: Practical: 20Hrs/Week | | Credits  20 | Evaluation Scheme:  CIE: 50Marks  SEE: 100Marks  TOTAL: 150Marks | | |
| **Course Objectives:**   1. To identify the problem /idea and review and summarize the literature for the topic of the identified problem & to provide a platform to students to enhance their practical knowledge and skills 2. To describe the process flow for undertaking the research/survey trials with appropriate standards and process variables 3. To design, development, construction, and fabrication of innovative product/system for the final submission 4. To explain various tools of testing and statistical analysis for the data in order to draw relevant conclusions | | | | | |
| **Course Outcomes:**  On completion of the course, student will be able to–   1. Describe the problem /idea and review and summarize the literature for the topic of the identified problem 2. Illustrate the suitable design of experiments including experimental plan. 3. Explain the concepts of design, development, construction, and fabrication of innovative product/system for the project title 4. Use various tools of testing and statistical analysis for the data in order to draw relevant conclusions | | | | |
| **Course Contents** | | | | |
|  | **Rationale** | | |  |
| The Dissertation work is divided into 2 phases. Phase 1 will involve the finalization of topic of project, Literature survey, Plan of action and at least half of the project trials (50%) should be completed. The project will be chosen with reference to design, development, construction, and fabrication of innovative product/system approved by the department/Guide. This is a laboratory-oriented course which will provide a platform to students to enhance their practical knowledge and skills by development of novel and intelligent product. Each student must keep a project notebook. | | | | |

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| **DKTES Textile and Engineering Institute, Ichalkaranji**  **Second Year M. Tech. (Semester – IV)**  **01TED602: Dissertation Phase II** | | | | |
| Teaching Scheme: Practical: 28Hrs/Week | | Credits  28 | Evaluation Scheme:  CIE: 100Marks  SEE: 200Marks  TOTAL: 300Marks | | |
| **Course Objectives:**   1. To identify the problem /idea and review and summarize the literature for the topic of the identified problem & to provide a platform to students to enhance their practical knowledge and skills 2. To describe the process flow for undertaking the research/survey trials with appropriate standards and process variables 3. To design, development, construction, and fabrication of innovative product/system for the final submission 4. To explain various tools of testing and statistical analysis for the data in order to draw relevant conclusions | | | | | |
| **Course Outcomes:**  On completion of the course, student will be able to–   1. Describe the problem /idea and review and summarize the literature for the topic of the identified problem 2. Illustrate the suitable design of experiments including experimental plan. 3. Explain the concepts of design, development, construction, and fabrication of innovative product/system for the project title 4. Use various tools of testing and statistical analysis for the data in order to draw relevant conclusions | | | | |
| **Course Contents** | | | | |
|  | **Rationale** | | |  |
| The Dissertation work of Phase II is mainly the completion of the remaining 50% of the project work. This includes the compilation of results, results and discussions, conclusions. | | | | |
|  | **Guidelines** | | |  |
| Guidelines for Dissertation Phase II:  a) Students should complete and compile the trials, testing.  b) Students should propose a complete thesis writing with given guidelines  c) Students will be ready for the internal Viva with synopsis, objectives, plan of work and results and discussion.  d) The results and discussion will be as per in line with the plan of work. No deviation is allowed.  e) The students have to present their work in front of the internal dissertation evaluation committee.  f) The suggestions from internal experts should be incorporated in the soft copy of the final thesis.  g) Sufficient time of 2 weeks will be given for the corrections.  h) The corrected soft copy can be verified from the allotted faculty. If it is OK as per the guidelines, then thesis will be printed, bound.  i) The bound copies will be submitted to the institute for further action on the externals. | | | | |