



**SGGS INSTITUTE OF ENGINEERING & TECHNOLOGY, NANDED**  
(An Autonomous Institute of Government of Maharashtra)

**T.Y. B.Tech. (Textile Technology) Curriculum Structure: Academic year 2016-17 onwards**

Semester V						
Course Code	Course Title	Lectures (L)	Tutorials (T)	Practical (P)	Credits	
					Th.	Pr.
TT351	Yarn manufacture- III	03	00	02	03	01
TT353	Weaving Technology-III	04	00	02	04	01
TT355	C++ & Computer Graphics	04	00	02	04	01
TT357	Man Made Fibres	04	00	02	04	01
<b>Elective – I</b>						
MA302 A	Mathematics - IV (Complex Analysis)	04	00	00	04	00
MA302 B	Mathematics - IV (Statistics & Probability)	04	00	00	04	00
MA302 C	Mathematics - IV (Numerical Methods)	04	00	00	04	00
	Total	19	00	08	19	04
					23	
Semester VI						
Course Code	Course Title	Lectures (L)	Tutorials (T)	Practical (P)	Credits	
					Th.	Pr.
TT352	Yarn manufacture- IV	04	00	02	04	01
TT354	Weaving Technology-IV	04	00	02	04	01
TT356	Textile Wet Processing- I I	03	00	02	03	01
<b>Scheme A: Elective II &amp; III ( Any Two) Scheme B: Elective II , III &amp; IV (Any Three)</b>						
TT358 A	Post Spinning & Texturing	04	00	00	04	00
TT358 B	Fibers for Composite	04	00	00	04	00
TT358 C	Theory of Textile Structures	04	00	00	04	00
TT358 D	Garment Technology	03	00	02	03	01
TT358 E	Costing & Financial Management	04	00	00	04	00
TT358 F	DBMS	03	00	02	03	01
TT360	Seminar & In-plant Training*	00	01	02	00	02
	Total	17/18/19	01	8/10/12	17/18/19	5/6/7
					24	
Cumulative Total					134	

\* The evaluation will be carried out at the end of semester - VIII

**Note :-**

- i) 'Scheme – A' and 'Scheme – B' to be offered to the students of final semester (i.e. Sem. VIII). The students can opt for any one the Scheme.
- ii) The student in scheme B can complete extra credits than scheme A; either in VI th or VII th semester.

# **TT 351 : Yarn Manufacturing – III**

## **(L03 -T0- P02): 04 Credits**

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### **Course Educational Objectives (CEO) :**

The student should learn

- CEO 1 This course deals with technology and working mechanisms of Combing and Speedframe machines
- CEO 2 Students will also learn the effect of different process and machine parameters on sliver and roving manufacturing and their quality
- CEO 3 This course will enable students to design and manufacture combed sliver and roving required for yarn production.

### **Course Outcomes (COs) :**

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

- CO 1 Students will learn fundamentals of technology and working of Combing and Speedframe machines.
- CO 2 They will understand the relationship of various process and quality aspects of combing sliver and roving production.
- CO 3 Students will be able to analyze and experiment on the issues related to process and quality parameters.
- CO 4 This course will enable students to design and manufacture intermediate products required for yarn production

### **Content :**

#### **1 Combing :**

1. Theory of lap preparation and its importance, Pre-comber draft and doubling, Construction and working of Sliver lapper, Ribbon lapper and Super lapper/ Lap former machines
2. The object and principle of combing, Details of working and construction of combing machine, Comber gearing, Draft and production calculation, Different combing actions and their mechanisms- Nipping, Feeding, Piecing and Detaching, Combing cycle and timing diagram
3. Noil and its measurement, Theory of noil extraction, Forward and backward feeding, Influence of machine settings and other parameters on combing, Settings in comber, Design features of modern combers

## 2 Speedframe (Roving) :

1. Functions of Speedframe, Principle of winding and twisting- flyer leading and bobbin leading, Design of different flyers, Construction and working of speed frame, Drive in speedframe, Draft and production calculation
2. Fundamentals of differential gearing, Differential motions in speed frame and related calculations, Theory and design of cone-drums, Working of building mechanism- adjustments and related calculations, Roving tension, Coil spacing and layers of roving in bobbin, Design features of modern speed frames
3. Importance and influence of various components/parts and parameters on drafting process, Details of construction and working of different spring-loaded and pneumatic drafting systems in speed frame, Stop motions
4. Brief Outline of Worsted Spinning: Worsted top making fundamentals, Scouring, Drying, Details of working of roller and clearer card, Gill-box drawing, Combing and top conversion

### Practical :

- 1 Study of gearing diagram of the speed frame. Calculate the spindle speed, top cone drum speed. Also calculate the bottom cone drum speeds at various diameters
- 2 Study the building mechanism. Calculate the bobbin rail speeds at various bottom cone drum speeds and corresponding time required to complete one complete traverse.
- 3 Study the differential mechanism of speed frame and calculate the bobbin speeds at various bottom cone drum speeds.
- 4 Calculate the layers/inch and coils/inch of a roving bobbin
- 5 Study the drafting system of speed frame. Calculate the draft and draft constant of the system
- 6 Study of combing machine and gearing.
- 7 Calculate the actual draft and mechanical draft of and production a combing machine.
- 8 Find out the noil percentage of a given comber

### References :

- 1 A Practical Guide to Combing and Drawing, Vol.-3 by W. Klein, (The Textile Institute)
- 2 Man-made Fibres and their Processing, Vol.-6 by W. Klein, (The Textile Institute)
- 3 Fundamentals of Spun Yarn Technology by Carl A. Lawrence, (CRC Press)
- 4 Textile Mathematics, Vol.-2 by J. E. Booth, (The Textile Institute)
- 5 The Drawframe, Comber and Speedframe, Vol.IV, Part-II by Frank Charnley, (The Textile Institute, Manchester)
- 6 Contemporary Textile Engg. by F.Happy, (Academic Press)

# TT 353 : Weaving Technology - III

## (L4-T0-P2): 5 Credits

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### Course Educational Objectives (CEO):

The student should learn

- CEO 1 Principle and working of different types of doobby, Jacquard and multiple box.
- CEO 2 To prepare designs produced on doobby, Jacquard, and drop box.
- CEO 3 Modern developments in industry regarding doobby, Jacquard and multiple box.
- CEO 4 Advanced fabric design and their manufacturing.
- CEO 5 Calculations on raw material requirement to weave a cloth.
- CEO 6 Learning of latest developments in the industry.

### Course Outcomes (COs):

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

- CO 1 Understood doobby, Jacquard, and multiple box motion
- CO 2 Learning of different fabric designs which are produced on doobby, Jacquard and drop box.
- CO 3 Get knowledge about latest developments in doobby and Jacquard
- CO 4 Understood advanced fabric design and manufacturing of fabrics with these designs.
- CO 5 Calculate the warp and weft requirement for particular cloth weave.
- CO 6 Understood of techno-economic developments in doobby, jacquard and drop box.

### Content :

1. **Dobby Shedding:** classification, Purpose and use of doobby, Working, drive, settings & pegging of a double lift double jack doobby, Pick finding & heald leveling devices for doobbies, Modern doobbies such as Cross border doobby, negative & positive cam doobby, paper pattern, Knowles positive doobby, mechanical & electronic Rotary doobby, defects & its remedies, calculation related to weight of warp & weft required to weave a cloth, weight per square meter of a cloth, information related to latest machines, cost & manufacturers
2. **Jacquard:** classification, Purpose and use of Jacquard, elements of Jacquard, construction, working, drive & settings of a double lift single cylinder & double cylinder Jacquard, systems of harness mounting, tie-ups, pattern card preparation, modern Jacquard such as open shed Jacquard, mechanical Jacquard, Electronically controlled jacquard, working principle of Staubli,

Gross and Bonas Jacquard, defects & its remedies, information related to latest machines, cost & manufacturers.

3. **Multiple Box Motions:** It's importance. Types of drop box motion. Cow burn and Peck box motion, Pattern card preparation, card saving device.
4. **Textile Designing:** Bedford cords, extra warp & weft figured fabrics, backed fabrics, pique fabrics, crepe weave, structure of double cloths Varieties of fustian fabrics, velveteen, Corduroy fabrics and their constructions, Different methods of formation of terry pile fabrics. Terry pile structures and their requirements. Gauze and leno fabrics. Use of computer in fabric design: CAD for dobby & jacquard, design algorithm.

### **Practical:**

- 1 To study a Climax dobby & study the different settings.
- 2 Select a weave and prepare a design lattice
- 3 Study in details the Double lift single cylinder jacquard.
- 4 Study any multiple box ----- During mill visit.
- 5 Development of a design of jacquard
- 6 Fabric analysis (at least 3 samples) : EPI, PPI, repeat, drafting & lifting plan, GSM, use.
- 7 Calculation of cloth produced on Dobby, Jacquard & Drop box related to weight of warp & weft required to weave a cloth, GSM.
- 8 Prepare at least 03 different samples on pilot loom (Handloom) and represent them on graph paper with drafting and peg plan. Eg. Bedford cord, Satin, Broken twill/ zigzag twill, Double cloth, Brighton weave.
- 9 Visit & collect information related to modern machines, model, manufacturer, cost etc. from industry
- 10 Collect at least 10 samples from daily use which can be produced on Dobby, Jacquard & Drop box and analyze it

### **References:**

- 1 Handbook of weaving by Sabit Adanur, Publisher – Technomic publishing
- 2 Weaving machines, mechanisms management by M.K.Talukdar, P.K.Sriramulu, D.B. Ajgaonkar, Publisher –Mahajan publishers
- 3 Woven fabric production-II, NCUTE
- 4 Watson Textile Design & Colour by Grosicki, Publisher – Woodhead Publishing
- 5 Grammar of Textile Designing by H. Nisbeth. Publisher – New York (N.Y.):Van Nostrand,1927
- 6 Fabric structure & design by N Gokarneshan, Publisher – New age international publishers

# **TT 355 : C++ & Computer Graphics**

## **(L04-T0-P02): 05 Credits**

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### **Course Educational Objectives (CEO):**

The student should learn

- CEO 1 Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects
- CEO 2 Understand dynamic memory management techniques using pointers, constructors, destructors, etc
- CEO 3 Describe the concept of function overloading, operator overloading, virtual functions and polymorphism
- CEO 4 Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming.
- CEO 5 Demonstrate the use of various OOPs concepts with the help of programs.
- CEO 6 This course is designed to provide a comprehensive introduction to computer graphics leading to the ability to understand contemporary terminology, progress, issues, and trends.

### **Course Outcomes (COs):**

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

- CO 1 Be able to develop, design and implement simple computer programs.
- CO 2 Understand functions and parameter passing.
- CO 3 Be able to do numeric (algebraic) and string-based computation.
- CO 4 Understand object-oriented design and programming.
- CO 5 Understand dynamic memory allocation and pointers.
- CO 6 Be able to design, implement, and test relatively large C++ programs.
- CO 7 Students will have an appreciation of the history and evolution of computer graphics, both hardware and software
- CO 8 Students will have an understanding of 2D graphics and algorithms including: line drawing, polygon filling, clipping, and transformations
- CO 9 Students will understand the concepts of and techniques used in 3D computer graphics, including viewing transformations, hierarchical modeling, color, lighting and texture mapping.

## **Content :**

- 1 Overview of C & Introduction to C + + .Structured versus object oriented development, Elements of OOP, objects, classes, Encapsulation, Inheritance, polymorphism, message communication.
- 2 Classes and Objects: Class specification, class objects, member access, defining member functions, constructors and destructors, passing and returning objects as arguments, friend functions.
- 3 Polymorphism and Inheritance: Method, function, and operator overloading; Derived class declaration, forms of inheritance, inheritance and member accessibility
- 4 Graphics : Graphics library of Turbo C/C + + : preliminaries- display adapters, graphic mapping, resolution, coordinates etc; text in graphics mode, drawing graphics- line, circle, arc, polygon etc. Bit images, animation

## **Practical:**

- 1 Minimum Eight experiments based on above syllabus

## **References:**

- 1 Object oriented programming with C + + - by E. Balguruswamy
- 2 K.R,Venugopal et al; Mastering C++, Tata Mcgraw Hill Pub.
- 3 Herbert Schildt, Teach Yourself C++, Tata Mc Graw Hill Pub.
- 4 Mastering Turbo C, Stan Kelly- Bootte, BPB Pub

# **TT 357 : Manmade Fibers**

## **(L04-T0-P02): 05 Credits**

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### **Course Educational Objectives (CEO):**

The student should learn

- CEO 1 Basic methods of filament manufacturing
- CEO 2 Synthesis of polymers and fibers like viscose, polyester, nylon, acrylic
- CEO 3 Physical and chemical properties of above fibers
- CEO 4 Manufacture and properties of high performance fibers like Kevlar, glass, carbon
- CEO 5 Spin finish composition and purpose
- CEO 6 Structural and thermal characterization of fibers

### **Course Outcomes (COs):**

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

- CO 1 Determine suitable method and parameters for spinning of a filament
- CO 2 Determine process temperature looking to thermal behavior of a fiber
- CO 3 Compare properties of various fibers for probable application
- CO 4 Select suitable spin finish for a fiber and process
- CO 5 Select high performance fiber for special applications
- CO 6 Determine thermal effect on fiber properties and structure

### **Contents:**

- 1 Fundamentals of fluid flow and spinning, Methods of fiber spinning and their comparison
- 2 Fundamentals of melt spinning, Components, Melt spinning variables and their impact, Calculations for throughput rate
- 3 Synthesis of Polyethylene Terephthalate, Properties and Applications
- 4 Synthesis of Nylon 6 and Nylon 6,6, Properties and Applications
- 5 Synthesis of Acrylic, Properties and Applications
- 6 Synthesis of Polyethylene, Properties and Applications
- 7 Synthesis of polypropylene, Properties and Applications
- 8 Synthesis of Viscose Rayon, Properties and Applications
- 9 Synthesis of Aramide fibers, Properties and Applications
- 10 Synthesis of Carbon fibers, Properties and Applications



- 11 Synthesis of Glass fibers, Properties and Applications
- 12 Synthesis of Viscose Rayon derivatives, Properties and Applications
- 13 Spin Finish: Composition, Methods of applications, Role in spinning, Estimation methods
- 14 Structure of Manmade Fibers, T<sub>g</sub>, T<sub>m</sub> and factors influencing them
- 15 Morphology of Manmade Fibers: Two phase Models, Fringe Micellar model
- 16 Characterization Methods: X-ray, Density Meter, Polarization, DSC, TMA
- 17 Developments in Manmade Fibers: Microfilaments, Bicomponent Fibers

### **Practical:**

- 1 Synthesis of a Homo-Polymer.
- 2 Synthesis of a Co-Polymer.
- 3 Synthesis of a thermo-Sett Resin.
- 4 Determination of Viscosity Average molecular weight of any polymer.
- 5 Determination of molecular weight by End Group Analysis and find degree of Polymerization.
- 6 To find Denier & DPF of different POY, DY & Textured yarns.
- 7 To determine BWS% of POY, DY & Textured yarns.
- 8 To determine spin finish of a filament.
- 9 Draw a POY in table model drawing machine.
- 10 To determine T<sub>g</sub> and T<sub>m</sub> using DSC.
- 11 Find density of a polymer by density gradient column method.
- 12 To determine birefringence by polarised microscope.
- 13 To determine crystallinity of a polymer by X-ray.

### **References:**

- 1 Winter School Notes on Manmade Fibers, by V B Gupta and V K Kothari, Publisher - Department of Textile Technology, IIT Delhi, 1988
- 2 Synthetic Fibers: Machines and Equipment, Manufacture, Properties : Handbook for Plant Engineering, Machine Design, and Operation, by Franz Fourné, Publisher Hanser, 1999
- 3 Handbook of Textile Fibres, Man-Made Fibres, by J. Gordon Cook, Publisher - Woodhead Publishing Series in Textiles
- 4 Carbon Fibers, by Park Soo Jin, Publisher - Springer, 2015
- 5 Introduction to Polymers, by Young & Lovel, Publisher - Chapman & Hall
- 6 Production of Synthetic fibres, by A A Vaidya.
- 7 Textile Fibres, by Shenai
- 8 High Speed fibre Spinning, by Ziabiki
- 9 <http://nptel.ac.in/courses/115103030/22>

# MA 302 A: Mathematics-IV (Complex Analysis) (L04-T0-P--): 04 Credits

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## Course Educational Objectives (CEO):

The student should learn

- CEO 1 To perform algebra with complex numbers.
- CEO 2 To identify complex-differentiable functions.
- CEO 3 To compute complex line integrals.
- CEO 4 To use residue theorem.
- CEO 5 To understand the conformal mappings and their engineering applications.

## Course Outcomes (COs):

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

- CO 1 Student will be able to compute sum, product, division, polar form, and nth roots of complex numbers and will also be able to understand their geometry.
- CO 2 Student will be able to identify the analytic functions and will be able to express these functions as a power series.
- CO 3 Student will be able to compute line integrals of complex functions through parameterization of curves.
- CO 4 Student will be able to use Cauchy's theorem, residue theorem to calculate line integrals and improper integrals.
- CO 5 Student will be able to use analytic functions as conformal mappings.

## Content :

- 1 **Introduction** : Introduction to complex variables
- 2 **Function of complex variables:** Limit, continuity, differentiability, analytic functions and their properties, Cauchy-Riemann equation, harmonic functions, elementary complex functions and their properties.
- 3 **Line Integral:** Cauchy's theorem, Cauchy's Integral formula, and their applications.
- 4 **Series:** Taylor and Laurent theorems, classification of singularities, residues, Cauchy's residue theorem, improper Integrals, conformal mappings.

## References:

- 1 Anant R. Shastri, *An Introduction to Complex Analysis*, Macmillan Publishers India (2000).
- 2 James W. Brown, Ruel V. Churchill, *Complex Variables and Applications (Seventh Edition)*, McGraw Hill (2003).
- 3 Erwin Kreyszig, *Advanced Engineering Mathematics (10th Edition)*, Wiley Publication

# MA 302 B : Mathematics-IV (Statistics and Probability) (L04-T0-P--): 04 Credits

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## Course Educational Objectives (CEO):

The student should learn

- CEO 1 To equip the students with the broad perspective of probability theory.
- CEO 2 To develop the understanding of various discrete and continuous distributions along with their properties.
- CEO 3 To understand and differentiate among various statistical and random processes techniques.

## Course Outcomes (COs):

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

- CO 1 Student will demonstrate the ability of data analysis and will be able to describe sample space for various random experiments
- CO 2 Student will identify the random variables as discrete and continuous random variables and will be able to apply appropriate distribution methods.
- CO 3 Student will be able to interpret the mean of a random variable in terms of the Law of Large Numbers.
- CO 4 Student will be able to use the Normal distribution, including the preservation of Normality under linear transformation.
- CO 5 Student will apply the Central Limit Theorem to problems involving sums and averages of variables from arbitrary distributions.
- CO 6 Student will be able to apply the tests of goodness of fit

## Contents:

- 1 **Introduction:** Sample Space and Events, Classical Probability, Conditional Probability, Independent Events, Bayes Theorem, Random Variable, Probability Measure, Sigma Field, Distribution Function
- 2 **Functions of Random Variables:** Expectation, Moment Generation Function and Its Properties, Characteristic Function.
- 3 **Distributions:** Special Discrete Distributions – Binomial, Poisson, Geometric, Special Continuous Distributions – Uniform, Exponential, Beta, Gamma. Normal Distribution
- 4 Chebychev's Inequality, Transformation of Variables, Joint and Marginal Distributions, Conditional Distribution.
- 5 **Covariance:** Correlation, Transformation of Variables, Independence of Random Variables, Random Vector, Weak Law of Large Numbers, Central Limit Theorem, Bivariate Normal Distribution
- 6 **Regression:** Regression, Least Square Method, Sampling Distributions of Parameters, Chi-Square, t and F Distribution.
- 7 **Theory of Estimation:** Theory of point estimation, Properties of Point Estimator, Maximum Likelihood Estimator, Interval Estimation, Confidence Interval, Testing of Hypotheses,

**References:**

- 1 Sheldon M. Ross, *Introduction to Probability and Statistics for Engineers and Scientists*, Elsevier (2012)
- 2 Vijay K. Rohatgi and A. K. Md. Ehsanes Saleh, *An introduction to probability and statistics*, Wiley (2011)
- 3 Richard A. Johnson, Miller and Freund, *Probability and Statistics for Engineers*, PHI Learning(2010)
- 4 Athanasios Papoulis and S. Unnikrishna, *Probability, Random Variables, and Stochastic Processes*, Tata McGraw Hill (2002)
- 5 Erwin Kreyszig, *Advanced Engineering Mathematics (Tenth Edition)*, Wiley Publication.

# **MA 302 C : Mathematics-IV (Numerical Analysis)**

## **(L04-T0-P--): 04 Credits**

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### **Course Educational Objectives (CEO):**

The student should learn

- CEO 1 To be aware of the use of numerical methods in modern scientific computing.
- CEO 2 To make the students familiar with finite precision computation, and numerical solutions of nonlinear equations in a single variable
- CEO 3 To learn numerical interpolation and approximation of functions
- CEO 4 To be familiar with numerical integration and differentiation, numerical solution of ordinary differential equations, partial differential equations.
- CEO 5 To provide knowledge of eigenvalue problems, QR Method.

### **Course Outcomes (COs):**

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

- CO 1 Students would be able to assess the approximation techniques to formulate and apply appropriate strategy to solve real world problems and be aware of the use of numerical methods in modern scientific computing.
- CO 2 Be aware of numerical methods to solve nonlinear equations.
- CO 3 Students would be able to apply interpolation formulas for real life problems.
- CO 4 Be familiar with numerical solution of integration, linear equations, ordinary differential equations, interpolations.
- CO 5 Students would be able to use linear algebra techniques and numerical techniques

### **Contents:**

- 1 Interpolation by polynomials, divided differences, error of the interpolating polynomial, piecewise linear and cubic spline interpolation.
- 2 Numerical integration, composite rules, error formulae.
- 3 Solution of a system of linear equations, implementation of Gaussian elimination and Gauss-Seidel methods, partial pivoting, row echelon form, LU factorization Cholesky's method, ill-conditioning, norms.
- 4 Solution of a nonlinear equation, bisection and secant methods.
- 5 Newton's method, rate of convergence, solution of a system of nonlinear equations, numerical solution of ordinary differential equations, Euler and Runge-Kutta methods, multi-step methods, predictor-corrector methods, order of convergence, finite difference methods, numerical solutions of elliptic, parabolic, and hyperbolic partial differential equations.
- 6 Eigenvalue problem, power method, QR method.

## References:

- 1 Kendall Atkinson, Weimin Han, Elementary Numerical Analysis (Third edition), Wiley Publication (2004)
- 2 Amos Gilat, Numerical Methods for Engineers and Scientists (Third Edition), Wiley Publication (2014)
- 3 Steven Chapra, Raymond Canale, Numerical Methods for Engineers (Seventh Edition), McGraw Hill Education (2014)
- 4 Erwin Kreyszig, Advanced Engineering Mathematics (10th Edition), Wiley Publication

# **TT 352 : Yarn manufacturing – IV**

## **(L04-T0-P02): 05 Credits**

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### **Course Educational Objectives (CEO):**

The student should learn

- CEO 1 This course deals elaborately with the technology and operation of Ring Spinning machines
- CEO 2 Students will also cover all other new spinning technologies and processes such as Rotor, Air-jet and Fiction spinning.
- CEO 3 The students will be exposed to all quality aspects of yarns and their relationship in yarn manufacturing
- CEO 4 Students will learn the design and manufacture of various yarns from apparel to technical and industrial applications

### **Course Outcomes (COs):**

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

- CO 1 Students will learn basics of ring spinning technology and process
- CO 2 Students will also get exposed to new spinning technologies and processes such as Rotor, Air-jet and Fiction spinning.
- CO 3 This course will enable the students to analyze and experiment yarn production.
- CO 4 Students will be competent enough to handle the ring spinning and rotor spinning processes of a spinning factory.
- CO 5 This course will enable students to design and manufacture yarns from apparel to technical and industrial requirements.

### **Content :**

#### **1. Ring Spinning:**

1. Ring spinning fundamentals, Principle of twisting and winding, Traveller lag and related calculation, Construction and working of ring spinning frame- gearing and drive, Various parts and their functions, Creel design, Structure and construction of spindle and types of spindle drives, Types of bobbin builds, Working of building mechanism
2. Concept of yarn balloon, Importance and details of lappet guide, balloon separator, balloon control rings, Forces acting on yarn element in the balloon during spinning, Causes of yarn tension variation in ring spinning, Forces acting on the traveller, Twist flow in ring spinning
3. Limitations of ring frame productivity, Design and shapes of ring/traveller combinations-

relative merits and demerits, Specification of ring and travellers, Doffing and auto doffing mechanism

4. Spinning geometry, Spring-loaded and pneumatic drafting systems in ringframe- design concepts, settings, roller pressure, aprons, cots, condensers, spacers, cleaners etc., Roller lapping- causes and remedies, Modern developments in ring spinning, Monitoring devices in ring spinning- ring data system

2.

### **Modern Spinning:**

5. Fundamentals of open-end/ break spinning, Construction and working of rotor spinning system, Mechanism of yarn twisting, Concepts of fibre flux and draft, production and twist calculation
6. Raw material requirements and preparation, Opening/Combing roller details, Fibre deposition and gap formation on rotor collecting surface, Factors influencing rotor spinning and yarn quality, Structure and properties of rotor yarns and comparison with ring yarns
7. Principle of Friction spinning, Mechanism of yarn twisting, Construction and working of OE-friction spinning, Dref-II, Dref-III machines, Structure and properties of friction yarns, Principle of Air-jet spinning. Concepts of edge fibres and geometry of edge fibre twisting, Structure and properties of air-jet yarns, Comparison with ring yarns
8. Principles of Self-twist spinning, Twist-less spinning, Compact spinning-details comparison with ring spinning, Core yarn spinning, Bobtex spinning etc. Siro yarn, Principles and manufacturing methods of various fancy yarns- slub yarn, marl yarn, corkscrew yarn, snarl yarn, loop yarn, knop yarn.

### **Practical:**

- 1 Study the path of the material through ring spinning machine. Also study and sketch the spinning geometry of the system with all major dimensions, angles etc.
- 2 Calculate the draft and draft constant of a given ring frame drafting system. Also calculate the break draft and break draft constant.
- 3 Calculate the spindle speed and yarn delivery speed of a ring frame. Also calculate the twist and twist constant of the ring frame.
- 4 Find out the angle of yarn pull at empty and full bobbin stages. Also calculate the winding revolutions and linear speed of traveller at empty and full bobbin stages in the given ring frame.
- 5 Study the bobbin building mechanism of the ring frame. From this mechanism and geometry calculate the approximate theoretical chase length.
- 6 Study the various setting and gauges required in ring frame.
- 7 Study the path of material through rotor spinning machine. Sketch the various parts involved.
- 8 Study the path of material through friction/air-jet spinning machine. Sketch the various parts involved.



## References:

- 1 A Practical Guide to Ring Spinning, Vol.-4 by W. Klein, (The Textile Institute)
- 2 New Spinning Systems, Vol.-5 by W. Klein, (The Textile Institute)
- 3 Man-made Fibres and their Processing, Vol.-6 by W. Klein, (The Textile Institute)
- 4 The Technology of Short Staple Spinning Vol.-1 by W. Klein, (The Textile Institute)
- 5 Fundamentals of Spun Yarn Technology by Carl A. Lawrence, (CRC Presss)
- 6 The Principles and Theory of Ring Spinning, Vol.-V by A. E. De Barr and H. Catling, (The Textile Institute)
- 7 Textile Mathematics, Vol.-2 by J. E. Booth, (The Textile Institute)
- 8 Open-end Spinning by V. Rohlena, (Elsevier Science)

# **TT 354 : Weaving Technology – IV**

## **(L4-T0-P2): 5 Credits**

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### **Course Educational Objectives (CEO):**

The course aims to:

- CEO 1 To understand basic concepts, principles and motions of automatic and modern weaving systems
- CEO 2 To learn more about advance weaving e.g. shuttle-less and multiphase weaving and fabric faults etc.
- CEO 3 To study techno economics of available weaving systems.
- CEO 4 To learn designing of advanced fabrics and their production.

### **Course Outcomes (COs):**

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

- CO 1 Understand conventional and new weaving technologies.
- CO 2 Write about features, principle motions of automatic and modern weaving systems
- CO 3 Apply knowledge of advance weaving systems in product and technology selection etc.
- CO 4 Draw designs of advance fabrics.

### **Content :**

1. **Automatic Weaving:** Classification, Pirn changing mechanism of Cimmco loom, Semi positive let-off motion, basic requirements, Effect of beam diameter & effect of angle of wrap on warp tension of freely rotating back rest and for fixed back rest, Roper let-off motion. Shuttle checking on automatic loom, General considerations- such as ideal shuttle checking, movement of shuttle during checking, Alacrity & its importance.
2. **Unconventional Weaving:** Its necessity, warp and weft requirements, building floor, humidification, control of dust, fibre fly and humidity, machinery maintenance and training, Selvage formation on unconventional looms, Weft accumulator, its importance- different types, Weft measuring systems, Comparison of various weft insertion systems
3. **Rapier Looms:** Classification of rapier looms, different systems of weft insertion, Positioning of weft insertion mechanism, Rapier driving, Weft changing mechanism, Density & quality of fabric, different electronic controls on machine.

4. **Air-Jet Looms:** Different systems of air-jet weaving, Different phases of insertion, and Traverse aids for maintaining of air flow (STRESS ON CONFUSER DESIGN), Relay jets, Methods of air-jet control. Air requirements, factors affecting pneumatic weft propulsion, Motion of weft, Nozzle design, Weft flight through the shed, automatic weft repair, nozzle design and different factors involved in it, factors affecting pneumatic weft propulsion, Fabric defects, quality produced, electronic controls on machine.
5. **Water Jet Looms:** Principles of water jet picking, Working of pump, pump details, The nozzle details. Quality of water and related aspects, Necessity of protection of machine parts, Water consumption, Cloth drying mechanisms, Timing diagram. New developments, Quality of woven fabrics & fabric faults.
6. **Gripper Projectile Loom:** Classification of projectile loom, Main features, advantages, transfer of weft from feeder to the projectile, Different phases of weft insertion, picking mechanism, beat-up mechanism, Power of picking, Projectile monitoring, Energy utilisation. Mechanism for multicolour weft insertion.
7. **Multiphase Weaving Machines:** Introduction, Advantages and disadvantages of multiphase weaving, Classification, warp way multiphase weaving machine, weft way phase difference weaving machines, shedding, picking and beat-up mechanisms. Principles of working Sulzer Ruti M8300 multiphase weaving machine
8. **Carpets:** basic features and manufacturing process of hand/machine knotted, woven (Brussel, Wilton, Axminster) and Tufted carpet
9. **Triaxial Weaving:** - Structure and Properties of triaxial woven fabrics, applications, weaving equipment for triaxial weaving
10. **Narrow Fabric Weaving:-** Introduction, Scope of narrow fabric weaving, applications b. Preparation – Machines and processes for assembling warps, various warping processes used, weft preparation. Technology of narrow fabric weaving – Machine construction, Shuttle looms, needle looms, warp feed systems from beams, creel for elastomeric yarns, shedding by cam and links, pattern chain preparation for different weaves, weft insertion systems( needle loom) , various selvedge forming systems on needle loom, drives to different elements, take up. Application of weaves in narrow fabric weaving.
11. **Manufacture of Labels:** - Applications, labels with woven selvedge and cut selvedge. Printed labels, fabric specifications, specifications of jacquard used, feed material specifications. Braiding: - Introduction, classification (rounds and flat braids), applications, raw material used

for braids, machines used for braiding (drive, yarn supply, Braiding technology, take up.)

- 12. Techno -Economics of Shuttle less Weaving:** Introduction, Scenario, value rating of different technologies, economic aspect, conclusion

### **Practical :**

- 1 Setting of Automatic cop changing mechanism of CIMMCO Loom
- 2 Weft feeler mechanism of CIMMCO Loom
- 3 Let-off motion on CIMMCO Loom
- 4 Setting of (a) Shuttle Box, (b) Weft cutter, (c) Dagger on CIMMCO Loom
- 5 Study of Rapier loom for its a. Shedding b. Weft Accumulator c. Rapier Centering d. Let-off e. Selvage formation mechanism
- 6 Working on CAD, create dobby /jacquard designs (01 samples) along with their draft, lifting plan on computer.

### **References :**

- 1 Shuttless Wvg.Machines by Oldrich Talavasek and Vladimir Svaty.
- 2 Principles of Weaving - by Mark & Robinson
- 3 Weaving Mechanism by Banerjee N.N.
- 4 Technology of H.S.Wvg.Machines & their design - ISTE Winter School Programme 3<sup>rd</sup> - 15<sup>th</sup> Dec. 90 PSG College of Technology, Coimbtore.
- 5 Automatic Weaving by Tairo.
- 6 Modern weaving preparation by By Ormerod
- 7 Weaving machines, mechanisms, management by M.K. Talukdar, P.K.Sriramulu, .B.Ajgaonkar, Publisher -Mahajan publishers
- 8 NCUTE - Pilot Programme - Weaving-II, Shuttleless Loom. October. , 7-9,1999 IIT, Delhi.

## **TT 356 : Textile Wet Processing – II**

### **(L03-T0-P02): 04 Credits**

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#### **Course Educational Objectives (CEO):**

The student should learn

- CEO 1 To explain principles of dyeing machines for synthetics.
- CEO 2 To explain different dyeing methods for polyester.
- CEO 3 To clarify methods & precautions for blended fabric & other synthetic fabric dyeing.
- CEO 4 To introduce problems, features & methods of dyeing with natural dyes.
- CEO 5 To introduce basics of printing fabrics.
- CEO 6 To introduce different printing machines.
- CEO 7 To introduce different printing methods.
- CEO 8 To introduce simple finishes to fabrics.

#### **Course Outcomes (COs):**

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

- CO 1 Students developed understanding in engineering knowledge of different synthetic fibres dyeing, machines involved, printing technology as well as basics of natural dyes , finishing & coating of textiles.
- CO 2 Students developed understanding of problem analysis skills in identifying different defects during synthetic fabric dyeing & their quality evaluation.
- CO 3 Students developed to conduct investigations of complex problems like measuring of blends of different fibres mix , identify different fibres & recipe preparation.
- CO 4 Students developed understanding of Modern Tools required for processing & measurements of different parameters in chemical wet processing of synthetic textiles & printing process.
- CO 5 Students developed understanding to work as Individual & team work through conducting different individual & group assignments & practical job work.
- CO 6 Students developed understanding in Effective communication through repeated written & oral test & assignments of the subject.

## Content :

1. **Dyeing Machines:** Principle and technology of different dyeing machines like – HTHP Beam dyeing machine, Jet dyeing machine Continuous Dyeing line and their latest developments.
2. **Dyeing of Man-made Fabrics/Fibres:** Different Mass Coloration/Dope dyeing techniques; Dyeing of synthetics like viscose rayon, polyester, polyamide, poly acrylic fabrics with suitable dyes.
3. **Dyeing of Blends:** Dyeing of polyester/viscose, polyester /cotton blended fabric with disperse reactive and disperse vat dyes. Dyeing of polyester/wool blends. Dyeing textured polyester & micro denier filament fabric.
4. **Natural dyes:** Introduction to Natural dyes; It's sources and classifications. Problems and prospects of natural dyes
5. **Printing Basics:** Introduction to printing. Different methods & styles of Printing; Printing paste ingredients; Ageing , Steaming & Curing
6. **Printing Machines:** Working of flat bed and rotary screen printing, Printing screen preparation, Transfer printing & Digital printing. Features of different latest printing machinery
7. **Printing Process:** Printing of cellulosic fabrics with reactive, vat dyes & pigments. Printing of polyester with disperse, Silk/Wool with acid dyes. Printing of P/C blended fabrics with disperse/reactive & disperse /vat dyes. Problems in printing.
8. **Finishing:** Introduction to finishing of textiles, Temporary & Permanent finishing, Heat setting & Calendaring. Introduction to coating of textiles.

## Practical:

- 1 Chemical Methods of identification of textile fibres
- 2 Determination of P/C & Poly/Wool blends by chemical methods
- 3 Dyeing of Rayon with Reactive dyes.
- 4 Dyeing of nylon with acid dyes.
- 5 Dyeing of Nylon with Disperse dyes.
- 6 Dyeing polyester with Disperse dyes & Carriers.
- 7 Dyeing of polyester in HTHP machine.
- 8 Dyeing of P/C blends with Disperse/ reactive dyes.
- 9 Dyeing of P/C blends with Disperse/Vat dyes.
- 10 Dyeing of Acrylics with cationic dyes.
- 11 Printing Cotton fabrics with Direct dyes.
- 12 Printing cotton fabric reactive dyes.
- 13 Printing Polyester with Disperse dyes.
- 14 Tie Dyeing of Cotton fabric.
- 15 Batic Printing of cotton fabric.

## References:

- 1 Dyeing & Chemical Technology of Textile Fibres, by E. R. Trotman; Publisher - Charles Griffin & Company Ltd.
- 2 Fundamentals & Practices in Colouration of Textiles, by Chakraborty J. N.; Publisher- Woodhead Publishing India in Textiles.
- 3 Technology of Textile Printing; by R.S.Prayag; Publisher - Mrs. L.R.Prayag, Dharwad, Karnataka State.
- 4 Technology of Textile Processing – Vol-IV "Technology of Printing" by Dr.V.A.Shenai.; Publisher - Sevak Publications, Mumbai
- 6 Textile Preparation & Dyeing, by Roy, Choudhury A.K., Publisher - Oxford & IBH Publishing Co. Pvt. Ltd.
- 7 Technology of Textile Processing - Vol.6, "Technology of Dyeing" by Dr. V. A. Shenai Publisher - Sevak Publications, Mumbai.
- 8 Technology of Textile Processing - Vol.2,"Chemistryof dyes & Principle of dyeing" by Dr. V. A. Shenai., Publisher - Sevak Publications, Mumbai.
- 9 Book of Papers: Convention on Natural Dyes-Dec-1999; Published By: IITD.

# TT 358 A : Post Spinning & Texturising (L04-T0-P--): 04 Credits

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## Course Educational Objectives (CEO):

The student should learn

- CEO 1 To educate basics of synthetic filament drawing, it's technology & effect on structures & properties due to drawing.
- CEO 2 To educate on heat setting & twisting machines & technology.
- CEO 3 To educate basics of texturing of filaments, their varieties & DT yarn production technology & properties in details.
- CEO 4 To educate on Air Jet texturing process & technology
- CEO 5 To enlighten basics of characterization of fibres & different instruments used

## Course Outcomes (COs):

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

- CO 1 Students understanding of engineering knowledge in post spinning operation & specially in texturising developed .
- CO 2 Students understanding of problem analysis skills in properties of drawn & textured filaments due to corresponding process parameters & fibre structural aspects developed .
- CO 3 Students understanding of conducting investigations of complex problems like reasons of anomaly in different property aspects developed.
- CO 4 Students understanding of Modern Tools & machines for post spinning operation & quality aspects measurement is developed.

## Content :

1. **Drawing:** Structure and properties of As spun filament, LOY, MOY and FOY; Objects of filament drawing; Comparison of one step process (OSP) with two step process (TSP); Significance of Tg on drawing; Neck drawing, homogeneous drawing; Temperatures and orientation induced crystallization; Factors affecting draw-ability and drawn yarn properties; Industry practices; Draw warping.
2. **Twisting:** Draw twisting and Two for One (TFO), Principles and mechanism of TFO machine.
3. **Texturising:** Purpose, classification of textured yarns; Different methods of Texturising; Twist-heat set-untwist methods, Edge crimping method; Stuffer box crimping; Structural geometry and properties of these types of textured yarns.



4. **Texturising methods and yarn properties:** False twisting and texturising; Mechanics of friction texturising; Sequential and simultaneous draw texturising; Different factors affecting texturing process & properties of textured yarns; Post treatment of false twist textured yarns; Properties of draw textured yarn; Defects of textured yarn.
5. **Air Jet texturing and other methods:** Air texturing jets; Different types of nozzles; Factors affecting air jet textured yarn process and properties; Different properties of textured yarns; Texturing of non thermoplastic yarns; Solvent texturing.
6. **Fibre Characterizations Methods:** Theories and applications of DSC, X-ray, TMA, TGA, Polarising microscope and Density Gradient Column for fiber characterization.
7. **Textured Yarn Characterization:** Methods of characterization of bulk and textured yarn.

### References:

- 1 Yarn Texturing Technology by J. W. S. Hearle, L. Hollick and D. K. Wilson; Publisher - Textile Institute, WoodHead Publishing House, U. K.
- 2 Production of Synthetic Fibers by A. A. Vaidya, 1<sup>st</sup> Edition, publisher - Prentice Hall of India, New Delhi, 1988.
- 3 Winter School on Manmade Fibers, Vol.-II; Edited by Gupta & Kothari, publisher - IIT Delhi, 1988.
- 4 Textile yarn structure & applications by Martindale, Goswami and Scerdino.
- 5 A Guide to Crimping/Texturising Technology;, Publisher - MANTRA, Surat.

# **TT 358 B : Fibers for Composite (L04-T0-P0): 04 Credits**

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## **Course Educational Objectives (CEO):**

The student should learn

- CEO 1 Basic components and classification of composites
- CEO 2 Manufacture of reinforcing fibers like ceramic, boron and properties of some high performance fibers
- CEO 3 Various matrix materials like epoxy, polyester
- CEO 4 Mechanics of composite material and calculations based on it
- CEO 5 Production techniques of composites like PMC
- CEO 6 Testing of composites
- CEO 7 Applications in various sectors such as construction, space, sports, biomedical etc.

## **Course Outcomes (COs):**

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

- CO 1 Determine suitable material for making a composite
- CO 2 Determine suitable process to manufacture a composite
- CO 3 Compare properties of various composites for probable application
- CO 4 Calculate composition of components suitable for an application
- CO 5 Select high performance fiber for special applications
- CO 6 Select post manufacturing process

## **Contents:**

1. Composites: Definition, Objectives, Classification, Applications
2. Fibers: Glass, Carbon, Ceramics, Boron, Polyamides, Kevlar, Alumina, Silicon derivatives
3. Matrix Materials: Polymers used, Properties of polymers, Thermoset and thermoplastic resins, Nonpolymeric materials

4. Fabrication: Hand lay, Bag molding, Pultrusion, Blow molding, Preformed molding, etc.
5. Mechanics: Isostress, isostrain conditions, Critical Fiber Length, Critical Fiber volume, Calculations for stress, strain and modulus; changes for continuous to discontinuous fibers, Failure mechanism
6. Applications: For structural engineering, electrical, civil, aerospace, defense, automobile, sports, medicine and others
7. Surface treatments, Flammability and fire resistance of composites, Laminated composites

### **References:**

- 1 Design and Manufacture of Textile Composites, by Long C A, Publisher - Woodhead Publishing Series in Textiles
- 2 Composite Materials, by K Srinivasan, Publisher - Narosa Publisher - House, Delhi
- 3 Analysis and Performance of Fiber Composites, by Bhagwan D. Agarwal, Lawrence J, Broutman, and K Chandrashekhara
- 4 Composite Materials: Design and Applications, by Daniel Gay, Suong V Hoa and Stephen W Tsai
- 5 Composite Material Science & Engineering, Springer Verlag
- 6 3D Textile Reinforcements in composite Materials, by Antonio Miravete, Publisher - Woodhead Publishing Series in Textiles
- 7 [www.nptel.ac.in](http://www.nptel.ac.in)

# **TT 358 C : Theory of Textile Structures (L04-T0-P--): 04 Credits**

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## **Course Educational Objectives (CEO):**

The student should learn

- CEO 1 Student will learn about theoretical models related to yarn and fabric with their analysis.
- CEO 2 Analysis of problems related fabric and correlate practical data with theory.
- CEO 3 They will be able to understand and analyze yarn structure and properties relations.

## **Course Outcomes (COs):**

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

- CO 1 Theory of fabric structure will be understood by the students and before manufacture of fabric in actual the designing of the structures can be possible with theory.
- CO 2 Students will able to understand yarn properties and structure relationship critically.
- CO 3 Students will be able to design and experiment of yarn manufacture and structural property aspect.

## **Content :**

### **1. Yarn Geometry :**

- 1. Geometry of twisted yarns, Idealized helical yarn geometry, Yarn diameter and twist, Count and twist factor, Twist contraction: Theoretical calculations and related numerical.
- 2. Limits of Twist, Average fibre length in twisted yarns and derivations, Packing of fibres in yarns, Packing coefficient, Open and close packing & numerical.
- 3. Small and large extension behavior of continuous filament yarns-related numerical, Extension and breakage behavior of spun yarns
- 4. Migration of fibres in yarns- Ideal and real, Characterization of migration behavior, Tracer measurements, Morton and his associates work and view on migration

### **2. Fabric Geometry :**

- 5. Float and weave value, warp & weft crimp, density of cloth, cover factor, elements of fabric geometry, cloth setting theories, plain and matt weaves.
- 6. Peirce's equations-Flexible thread model, plain woven fabrics assumptions, jamming condition, crimp-inter change equation, Race track model, Jamming conditions, Rigid thread model and crimp balance equation.
- 7. Plain Jersey knitted fabric geometry: Cover factor, loop-length, wrap angle.

## **References:**

1. Textile Yarn Structure & Application by Martindal & Goswami, Publisher - Wiley, 1977
2. Structural Mechanics of Yarns, Fibre and Fabrics by Grosberg, Hearle and Backer, Publisher - Wiley-Interscience, 1969
3. Cloth Geometry – Pierce

# **TT 358 D: Garment Technology (L03-T0-P02): 04 Credits**

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## **Course Educational Objectives (CEO):**

The student should learn

- CEO 1 Apply basic elements and principles of garment manufacturing.
- CEO 2 Handle and control garment manufacturing process
- CEO 3 Solve running problems of garment unit
- CEO 4 Design and produce a buyer specification garment

## **Course Outcomes (COs):**

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

- CO 1 Understand the garment manufacturing process and different fashioning deals.
- CO 2 Understand basic operations of garment manufacturing process.
- CO 3 Solve technical as well as managerial problems.
- CO 4 Able to stitch different types of fashioning garments.

## **Content :**

- 1 **Introduction** – Sectors and structure of apparel industry, Overview of Indian garment industry, Nature & scope of apparel manufacturing industry and its developments in recent years. Sequence of garment manufacturing process. Latest developments in garment technology.
- 2 **Preparation for sewing** – Grading, Types and making of lay plan, Requirements of spreading, types and methods of spreading, spreading equipments and tools, cutting equipments and tools and their modernization, size charts, Various terms used- Fashion cycle, fad, classic styles etc
- 3 **Sewing** – Types, construction & parts of sewing machines, Sewing machine needles, Feed mechanism – principles, feed teeth, types of feed, Stitching mechanisms – needles, loops, looper spreader, shuttle, hooks, different tension devices, bobbin and bobbin case, tongues and chaining plates, throat plates, stitching auxiliaries. Sewing defects.
- 4 **Stitching** – Difference between stitch, Stitching and seams and their classifications. Stitch class like 300,400, 500 600, 200 &100, Details of seam types and their uses. Fabric sewability, principles of selecting proper stitch and seam types, Effect of stitch type on elasticity and strength, Effect of stitch type on seam slippage. Switchless garments.
- 5 Garment manufacturing techniques such as fashioning, neck finishes, Darts, Plates, Tucks and Gathering. Sleeve insertion, hemlines, waist lines, contours of garments. Cost structure in garment manufacturing.
- 6 **Buttons** – Buttons, Characteristics of buttons, button size, and button applications, Snaps

- 7 **Fusing and pressing machinery** – Process, methods and equipments
- 8 Garment dyeing and finishing, Value added garments.
- 9 **Pressing & finishing:** object, classifications, means, components, machinery and equipments, garment finishing and inspection, Quality Standards of some giant retailers, TUV, SGS and ASTM testing standards.
- 10 **Production technology:** Manual systems, make through systems, straight line systems, modular production systems, unit production systems, quick response systems
- 11 **Ware housing:** Handling equipments, storage equipments, packing equipments.
- 12 Application of CAD/CAM in garment manufacturing

### **Practical:**

- 1 Study of various parts of sewing machines their functions and objectives.
- 2 Some attachment to sewing machines.
- 3 Study of different types of stitching machines available in the industry.
- 4 Study of different stitches and seams.
- 5 Draw a sketch drafting of a denim trouser and stitch a garment of own size.
- 6 Draw a sketch drafting of a T- shirt and stitch a garment of own size.
- 7 Study the organization and flow chart of a clothing manufacturing company.
- 8 Visit to a clothing manufacturing company and study the pattern construction, lay plan, and spreading, cutting, stitching & pressing technique.
- 9 Study the fabric and sewing faults, safety measurements and work measurements practices.

### **References:**

- 1 The Technology of clothing manufacturing by Harold Carr, Barbara Latham, Publisher – Blackwell scientific publications
- 2 Handbook for designing by Ritu Jindal, S. Malhan, Publisher - Mittal Publications
- 3 Managing Productivity in the apparel Industry by Rajesh Bheda, Michael T. Fralix, Publisher – CBS publications & distributors
- 4 Ila Kantilal “The apparel industry in India”
- 5 CAD/CAM in clothing & Textiles by Grey and Stephens Publications – Gower Publishing, Hampshire, 1998.

# **TT 358 E: Costing & Financial Management (L04-T0-P--): 04 Credits**

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## **Course Educational Objectives (CEO):**

The student should learn

- CEO 1 To understand basic terms and concepts of costing
- CEO 2 To learn different costing methods adopted in a company
- CEO 3 To learn about financial management aspects of an organization
- CEO 4 To know how to raise funds for a company
- CEO 5 How to read and analyze Balance sheet and Profit – Loss Accounts of a company
- CEO 6 To learn how to prepare a financial project report for a new company

## **Course Outcomes (COs):**

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

- CO 1 Understand product cost sheet and company balance sheet & profit-loss accounts.
- CO 2 Solve overheads and costing related problems
- CO 3 Do Break- Even – Analysis for management decisions
- CO 4 Analyze company balance sheet for performance assessment
- CO 5 Compute assets depreciation and return from capital expenditure
- CO 6 Write a project report for new start-ups

## **Content :**

- 1 **Nature of financial management:**  
Basic Definition, Some of Finance Functions, Job of the Finance Manager, Financial Goal, Profit Vs Wealth
- 2 **Sources of finance:**  
Shares, Debentures and Term Loans, Convertible Securities and Warrants, Lease Financing, Venture Capital Financing, Management of working capital
- 3 **Statements of financial information:**  
Financial Statements, Balance Sheet, Assets, Liabilities, Equity, Relationship between Assets, Liabilities & owners Equity, Forms of the Balance Sheet, Profit & Loss Account, Ratio Analysis
- 4 **Cost classification and allocation:**



Nature of Cost, Cost Classification in a Manufacturing Firm, Cost Concepts for Planning & Control Cost Allocation, Distinction between Fixed and Variable Costs, Opportunity Costs and their use, Sunk Costs, Direct & Indirect Costs, Overheads, Controllable & Non controllable Costs

5 **Overheads:**

Definition, classification, primary & secondary distribution of overheads, Illustrations

6 **Job costing and process costing:**

Concepts, Comparison, Job cost sheet and Process cost sheet

7 **Marginal costing:**

Definition, concept of Fixed and Variable Costs, contribution, Break Even Chart, Break Even Point, Margin of safety, Profit -Volume Ratio, Effect of sales and costs on P/V Ratio

8 **Standard costing:**

Limitations of Historical Costs, General Principles of Standard Costing, Standard Costing & Budgetary Control: Standard Cost & Estimated Costs, Advantages of Standard Costing, Limitations of Standard Costing, Types of Standard Cost, Standard Cost for Direct Material, Direct Labour and Overheads, Computation & Analysis of Variances of Same

9 **Costing:**

Its application to Textiles, Determination of cotton Cost/kg, Conditioned Moisture Content on Relation to Cost, Pre-determining weaving Cost, Cost Calculations of Standard Fabrics, Finishing Department Cost Problems, Activity Levels, Use of Cost Accounting in Administering a Business

10 Methods of Asset Depreciation, Capital expenditure & profitability, Return on investment, Payback period, Discounted cash flow

11 Preparation of New Industrial Project Reports

## References:

- 1 Cost Accounting by ATIRA, Ahmedabad
- 2 Cost Control & Costing in Spinning Mills by T.V. Ratnam, Publisher - SITRA
- 3 Modern Management Accounting by S.P. Deshpande
- 4 Cost Accounting by Arora
- 5 Principles & Practices of Cost Accounting by N. K. Prasad & A. K. Prasad
- 6 Production & Operations Management by S. N. Chary
- 7 Cost Accounting: A Managerial Emphasis by Charles T. Horngren, Datar, G. Foster, M. V. Rajan and C. Ittner

# TT 358 F: DBMS

## (L03-T0-P02): 04 Credits

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### Course Educational Objectives (CEO):

The student should learn

- CEO 1 To provide sound introductions to the disciplines of the database.
- CEO 2 Provide different advance web storage
- CEO 3 Analyze data processing
- CEO 4 Storage of data and file structure.
- CEO 5 Transaction in distributed database.
- CEO 6 Indexing of database.

### Course Outcomes (COs):

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

- CO 1 Understand the basic concepts of data Storage.
- CO 2 Understand constraint required for database.
- CO 3 Analyze the data in normalized form.
- CO 4 Analyze the file structure in database
- CO 5 Evaluate the transaction occurred in daily life.
- CO 6 Evaluate and analyze the consistent transaction in database.

### Content :

1. **Introduction** : Purpose of database systems, view of data, data models, database languages, transaction management, storage management, database administrator, database users, overall system structure.
2. **Entry-Relationship Model** : Basic concepts, design issue, mapping constraints, keys, ER diagram, weak entity sets, extended E-R database schema, reduction of an E-R schema to tables
3. **Relational Model** : Structure of relational database, the relational algebra, the tuple relational calculus, the domain relational calculus, extended relational algebra operations, modifications of the database, views, Study of SQL, embedded SQL and other SQL features
4. **Relational Database Design** : Integrity Constraints, Domain constraints, referential integrity, assertions, triggers, functional dependencies. Pitfalls in relational database design, decomposition, normalization using functional dependencies, multi valued dependencies, join dependencies, domain key normal form, alternative approaches to database

design.

5. **Storage and File Structure** : Magnetic disks, RAID, Tertiary storage, File organization, organization of records in files, data dictionary storage, storage structures for object oriented databases
6. **Indexing and Hashing** : Basic concepts, ordered indices, B tree index files, static hashing.
7. **Transaction and Concurrency Control** : Transaction concept, transaction state, atomicity and durability, concurrent executions, serializability, recoverability, isolation, transaction definition in SQL, testing for serializability. Concurrency control, lock based protocols, time stamp based protocols, validation based protocols, multiple granularity, multiinversion schemes, deadlock handling, insert and delete operations, concurrency in index structures.
8. **Query Processing**: Overviews, cost estimation, measures of query cost, selection operation, sorting, join operation and join strategies, evaluation of expressions.
9. **Recovery System**: Failure classification, storage structure, recovery and atomicity. Log based recovery, shadow paging, recovery with concurrent transactions, buffer management
10. **Database system Architectures**: Centralized systems, client-server systems, parallel systems, distributed systems, network types
11. **Term Work**: Application development using ORACLE or Microsoft SQL Server or MySQL or using PHP or VC++ or JAVA as front-end processor.

### **Practical:**

- 1 Term work shall consist of at least 10 Programs based on the above syllabus and complete study and sample application development using VB or VC++ or JAVA or PHP as front-end processor and ORACLE or Microsoft Access or SQL server or Ms Sql as Back end server.

### **References:**

- 1 Silberschatz, Korth and Sudarshan, "Database system Concepts", McGraw Hill.
- 2 Aho Ullman, "Principles of Database Management"

# **TT 360: Seminar & In-plant Training (L—T01-P02): 02 Credits**

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## **Course Educational Objectives (CEO):**

The student should learn

- CEO 1 Students will visualize the working mechanism and operations of various machines in the factory.
- CEO 2 They will get practical and first hand experience of factory working.
- CEO 3 They will learn basics of human behavioral aspects and management skills.
- CEO 4 Students will know about various process and machines parameters required for the production process.

## **Course Outcomes (COs):**

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

- CO 1 Students will be able to correlate theory with practice.
- CO 2 Students will be able to experiment with machines and process parameters.
- CO 3 Students will be gradually feel confident to handle the actual real life factory problems.

## **Content :**

- 1 **Industrial Training:** Every student need to take 2 weeks industrial training after Third Semester & before Sixth Semester compulsorily. They need to present two to three seminars & submit bound copy of training report at the end of the Sixth semester for the evaluation.