

16TF304 TEXTILE MATHEMATICS

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P	WA/RA	SSH/HSB	CS	SA	S	BS
45	-	-	20	20	-	10	-	-

Course Description and Objectives:

This course offer introduction of basic units, elements of trigonometry, analysis of fiber dimensions, basic kinematics, weaving preparatory mathematical calculations and fabric structural calculations. Objective of this course is to impart basic knowledge and skill required to analyse fibre, yarn and fabric structural aspects.

Course Outcomes:

The student will be able to:

- know basic units and their conversions.
- understand the evaluation of fiber dimensional properties.
- describe basic kinematics used in textile applications.
- analyze winding, warping and weaving mechanics.

SKILLS:

- ✓ *Analyse fiber dimensions by using basic conversions.*
- ✓ *Interpret data by using graphical representation.*
- ✓ *Calculate the equation of motion and motion in circle in carding and draw frame.*
- ✓ *Calculate traverse motion and yarn tension in cone winding process.*
- ✓ *Identify fabric dimensional characteristics.*



ACTIVITIES:

- *Collect unit conversions used in textiles.*
- *Calculate velocity and time using equations of motion and motion in circle.*
- *Calculate production of carding, draw frame, simplex, ring frame and loom.*
- *Calculate yarn diameter by using different formulae.*

UNIT - 1**L-9**

INTRODUCTION: Definitions of basic units, Conversion of units from one system to another; Revision of basic mathematics - Symbols and formulae, Areas and perimeters, Ratio, Proportions, Percentages; Elements of trigonometry; Averages; Graphs and other forms of graphical representation.

UNIT - 2**L-9**

FIBRES: Fibre dimensions- Fibre length and fibre diameter, Fibre bundle strength, Work of rupture, Trash and lint content of cotton, Quantitative analysis of fibre mixtures, Fibre quality index (FQI) measurement.

UNIT - 3**L-9**

BASIC KINEMATICS: Equations of motions, Motion in a circle.

YARNS: Bale density, Lap density, Lap uniformity, Tuft size at the cleaning points, Calculations of the card mechanism, Twist factor, Irregularity yarn diameter, Drafting wave, Packing density of fibers and yarns.

UNIT - 4**L-9**

WEAVING PREPARATORY: Winding rate, Wind and traverse ratio, Yarn tension and tension devices, Yarn clearing and clearing devices, Sectional building calculations in warping, Efficiency calculations, Production calculations.

UNIT - 5**L-9**

FABRIC CALCULATION: Woven Fabric structure, Crimp percentage in woven fabric, Fabric areal density, Fabric cover and cover factor (Peirce), Loom calculations, Picking and beat-up calculations, Knitted fabric calculations - spirality, loop length, production calculations.

TEXT BOOK:

1. J. E. Booth, "Textile Mathematics," Volume-I, II & III, The Textile Institute, Manchester, 1975

REFERENCE BOOKS:

1. N. Gokarneshan, B. Varadarajan, C. B. Senthil Kumar, "Mechanics and Calculations of Textile Machines" Woodhead Publishing INDIA PVT LTD, 2013.
2. R. Marks and A. T. C. Robinson, "Principles of weaving", The Textile Institute, Manchester, 1976.
3. Hearle, Grosberg and Backer, "Structural Mechanics of Fibers, Yarns and Fabrics", Vol-I, Wiley-Inter-Science, New York, 1987.
4. B.C.Goswami, "Textile Yarns", John Wiley & Sons, New York, 1987.