

19TT212 TECHNOLOGY OF KNITS AND NONWOVENS

Hours Per Week :

L	T	P	C
3	1	-	4

Total Hours :

L	T	P	WA/RA	SSH/HSH	CS	SA	S	BS
45	15	-	10	45	-	-	-	-

PREREQUISITE COURSES : Yarn Manufacturing

COURSE DESCRIPTION AND OBJECTIVES:

This course provides an overview on knitting elements followed by warp knitting and weft knitting. Also it introduces different types of nonwoven manufacturing techniques and applications. The objective of this course is to make the students to familiar with knitted and nonwoven fabric manufacturing processes using various machines.

COURSE OUTCOMES:

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

COs	Course Outcomes	POs
1	Identify various knitting elements and machines to produce different types of knitted fabric structures such as plain, rib and interlock in weft knitting machines.	1,2
2	Discuss various design developments of weft knitting machines to develop latest fabric structures.	3
3	Review about the different web forming techniques and processes.	2
4	Review about the different web bonding techniques and methods to get desired quality.	2,4
5	Understand the different applications of nonwovens; various raw materials required such as natural and manmade fibers and the impact these into environment.	1,2,3,7

SKILLS:

- ✓ Construct different structures of knitted fabrics
- ✓ Compare the properties of knitted and nonwoven fabrics
- ✓ Identify knitted and nonwoven fabrics
- ✓ Able to prepare wet laid nonwoven web
- ✓ Prepare the binder solution for binding the nonwoven fibrous web



SOURCE:

<https://www.groz-beckert.com/en/products/knitting>.

UNIT-I **L-9**

INTRODUCTION TO KNITTING : Comparison of woven, nonwoven and knitted fabrics, fundamental terms of knitting technology, elements of knitting machine, various zones in knitting machine and their significance; Classification of weft knitting structures and machines.

WEFT KNIT STRUCTURES: Plain or single jersey, rib, interlock and purl, loop and needle diagrams to illustrate basic structures; A brief note on straight bar and flat knitting machines.

UNIT – II **L-9**

PATTERNING IN WEFT KNITTING : Scope and need, arrangements in cam for knit, miss stitch and tuck stitch, requirements for hosiery yarn, a brief note on common defects; A brief note on straight bar and flat knitting machines; Knitting dynamics: A brief note on forces acting on the needle, linear and nonlinear cams, needle breakages.

INTRODUCTION TO WARP KNITTING : Elements, a brief note on driving arrangements for guidebars, needle bars and sinker bars, basic lapping movements in warp knitting, loop formation in tricot and raschel knitting machines.

UNIT – III **L-9**

INTRODUCTION TO NONWOVENS : Definition of nonwoven, comparison of woven, knitted with nonwoven, tailor made classification of nonwoven, fibre as raw material for nonwoven fabric.

PRODUCTION OF DRY WEB : Fiber selection, fiber preparation, web formation, web removal system, carding, garneting, arrangement of cards, cross and vertical lapper.

AIR LAID WEB : Principle of web formation, feeding systems, rando webber, DOA, fehrer system, chicopee system, laroche system, spinnabau.

WET LAID WEB : Introduction to wet laying, raw material selection, fiber preparation, web forming concept.

BONDING SYSTEMS : Latex bonding, thermal bonding, hydro entanglement, parameters of wet laying, application.

UNIT – IV **L-9**

POLYMER LAID WEB : Introduction, resins for polymer laying, spunbond fabric production, various system, bonding methods, and parameters controlling the quality, applications, meltblown technology, properties and applications.

MECHANICAL BONDING : *Stitch Bonding*: malivlies, malimo, malipol and voltex bonding systems.

Needle Punching: Introduction, batt formation, drafting, passage of material, needle design, types and selection, parameters of needling, methods of needle punch technology, applications.

HYDROENTANGLEMENT TECHNOLOGY : Introduction, principles, fibre selection, process layout, process technology, pre-wetting, support surface, injectors arrangements, jet stripes and nozzles, dewatering, drying, multilayer hydroentangled nonwovens, applications.

UNIT – V **L-9**

THERMAL BONDING : Introduction, principles, raw materials, calender bonding, process parameters, through air and impingement bonding, thermal radiation, IR and ultrasonic bonding, structure of thermal bonded fabric, applications.

CHEMICAL BONDING : Introduction, polymers for chemical bonding, mechanism of chemical bonding, wetting, binder polymer cohesion, methods of binder applications, saturation, foam bonding, spray bonding, print bonding, coating bonding, solution bonding, drying, convection dryer, conduction dryer and IR dryers, applications.

FINISHING OF NONWOVENS : Wet finishing, application of chemical finishes, lamination, mechanical finishes, surface finishes, emerging technologies, 3D nonwoven; automotive trim applications.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Turbak, "Nonwoven Process Performance & Testing", 2nd edition, Tappi Press, Woodhead Publishing, Cambridge, 1993.
2. W. Albrecht, "Nonwoven Fabric Construction Synthetic Fibres", JWS Publications, 2007.
3. W B. Azagoankar, "Knitting Technology", Mahajan Textile Publishers, 5th edition, 2006.