PTX5I102 FABRIC MANUFACTURING-III

Course Objectives

- To enable the student to gain knowledge about various modern weaving machineries.
- To understand the mechanism of weft insertion in different modern looms.
- To know about high speed weaving.
- To learn about technology and processes for formation of knitted fabrics and non-woven fabric.

Course Outcomes

After successful completion of this course, the students will be able to

- Describe the limitation in shuttle loom and developments of various types of shuutlleless looms.
- Summarize the working of each elements in unconventional weaving machines.
- Illustrate the weft insertion cycle of different types of shuttleless looms.
- Calculate the WIR and production rate of the high speed weaving machines.
- Describe the various elements and mechanism of different types of knitting machines.
- Gain knowledge on different techniques for formation of non-woven fabric.

Module-I

Limitation of shuttle looms- Development of shuttleless looms - Classification of shuttleless looms – pre-requisites for shuttleless weaving. Techno economics of shuttleless weaving.

Gripper projectile Loom : Working elements and weft insertion cycle in projectile loom-Torsion bar picking mechanism-Weft selection device-Salient features of projectile loom, Weft insertion rate and production calculation.

Rapier Loom - Classification of rapier loom: Flexible, Rigid rapiers-Principles of tip and loop transfer-Weft insertion cycle-Rapier drives-Salient features. Weft insertion rate and production calculation.

Module-II

Air jet loom : Working principle – weft insertion mechanism - types of nozzles, profile reed. Air requirements. Weft insertion rate and production calculation.

Water jet Loom : Working principle - Weft insertion system – Nozzles - Water requirements – Weft insertion rate and production calculation.

Multiphase weaving machine: classification, principles of operation , shedding mechanisms of weft way and warp way,supply systems for weft, Fabric Defects

Module-III

Knitting Technology: Introduction to Knitting: Difference between woven and knitted products and process. Classification of knitting machines and mechanisms, terms and definitions used in knitting. Elements of knitting machine : needles, sinker and cam.

Yarn requirement for knitting, norms of cotton yarn for knitting, fibres used in knitting for both weft and warp knitting.

Weft Knitting: General description of weft knitting machines viz. Flat and Circular, primary knitting elements, types of Knitting Needles (Latch, bearded and compound); their knitting cycle, comparison and

use. Classification and representation of weft knit structures, structures and characteristics of plain, rib, interlock and purl structures. Float & Tuck Stitches and their effects on fabrics. Derivatives of Weft Knit Structures. Devices for needle selection. Yarn feeding and creels.

Warp Knitting : Basic principle, types of warp knitting machines, different motions, basic warp knitted structures, fabrics and their uses.

Fabric defects, Fabric parameters and constants, Fabric relaxation treatments, Calculation related to knitting.

Module-IV

Non-woven Technology: Introduction to non-woven technology. Types of fibres used and end uses of nonwovens, Methods of web preparation, Orientation of fibres in the web,

Methods of bonding of web, Production of non-woven fabrics by needle punching technique, Effects of process and machine variables on properties of nonwoven, Production of stitch bonding, spun bonding, thermal bonding nonwovens. Production of non-woven fabrics by Adhesive bonding, Characteristics and properties of adhesives. Developments and new trends in nonwoven techniques.

Books Recommended:

1. Sabit Adanur, —Hand book of weaving||, CRC Press Co. ISBN No. 1-58716-013-7, 2001.
2. Talukdar M K, Sriramulu P K and Ajgaonkar D B, —Weaving: Machines, Mechanisms and Management||, Mahajan publishers, Ahmedabad, 1981.
3. Talavasek O & Svaty V, —Shuttleless weaving machines||, Elsevier science publications, Newyork, 1981.
4. Ormerod A, —Modern preparation and weaving||, Butterworths, London, 1983.
5. Techno economics of modern weaving machines||, Textile Association (India), Bombay, 1982.
6. Woven Fabric Production I|| – Quality CBT & Course material from NCUTE, 2002.
7. Woven Fabric Production II|| – Quality CBT & Course material from NCUTE, 2002.
8. D. B Ajgaonkar., —Knitting technology|| Universal publication corporation, Mumbai, 1998.
9. Dr.N.Anbumani., —Knitting Fundamentals, Machines, Structures and Developments||, New Age International, 2006.
10. Chandrasekhar Iyer, Bernd Mammel and Wolfgang Schach, —Circular knitting||, Meisenbach Gmbh, Bamberg, 1995.
11. D.J. Spencer., —Knitting technology||, Textile Institute Manchester, 2005.
12. Chandrasekhar Iyer, Bernd Mammal and Wolfgang Schach., Circular Kintting, Meisenbach GmbH, Bamberg, 199.
13. Hand Book of Nonwovens – Edited by S.J.Russell, Wood head publications Ltd., ISBN-13: 978-1-85573-603-0, 2007.
14. Nonwoven Fabrics: Raw Materials, Manufacture, Applications, Characteristics, Testing Processes, Edited by Wilhelm Albrecht , Hilmar Fuchs and Walter Kittelmann, WILEY-CH Verlag GmbH & Co. KGaA, Weinheim,, ISBN: 3-527-30406-1, 2003.
15. Hand Book of Technical Textiles – Edited by S.C.Anand & A.R.Horrocks, Wood head publications Ltd., ISBN 1 85573 385 4, 2000.
16. Applications of Nonwovens in Technical textiles, Edited by R.A.Chapman, CRC press, 2010.