Subject: Fabric Studies

Unit 4: Knitted fabrics

Quadrant 1 – e-Text

Learning Objectives

The learning objectives of this unit are:

- Describe different types of knitting.
- Describe the process of weft knitting.
- Analyze the advantages of knits and Woven materials.
- Identify various knitting stitches.
- Understand typical knitted fabrics.
- Understand warp knits.

4.1 INTRODUCTION

The process of knitting started as household craft by womenfolk with the help of knitting needles. Hand knitting was replaced by machine knitting with the invention of knitting machines. Machine knitting started with the invention of knitting machine by Reverend William Lee in 1589.

Knitted fabrics are fabrics made of interlooping of yarns. A knitted fabric is made with one or more yarns. Horizontal row of loops are called courses and the vertical row of loops are called wales. They are widely used in various categories of apparel like T-shirts, blouses, home furnishings and in industrial applications.

4.2 TYPES OF KNITTING

Knitting is classified as weft knitting and warp knitting.

Weft knitting is the process of fabric formation where knitting of one or more yarns is done horizontally.

Weft knitting machines are of two types:

a. Circular knitting machine has knitting needles arranged in circular configuration which produces tubular fabrics.

b. Flat knitting machine has knitting needles arranged in straight bed. This machine produces flat fabrics.

Warp knitting is the process of fabric formation in which groups of yarns move vertically forming loops.

4.3. PROCESS OF KNITTING

The basic element of knitting is the knitting needle. It is widely used in weft knitting.

Loops are formed during the process of knitting by raising and lowering needles. As the needle raises, old yarn loop opens the latch and as the needle reaches the maximum height, it receives new yarn. The needle then starts descending down hence, the old loop knocks over and the new loop is held in the needle.

The process of knitting is much faster than weaving. Designs may be changed quickly in knitting than in weaving.

The gauge of the knitting machine decides the compactness of the fabric. Gauge is defined as the needles per inch of the machine.

Finer gauge machine produces finer fabrics with more wales per inch and coarser gauge machine produces coarser fabrics with fewer wales per inch.

4.4 KNITS VERSUS WOVEN

Loops in the knitted fabric facilitate freedom for yarn movement. Thus, knitted fabrics are flexible and stretchable whereas, woven fabrics are rigid and compact.

Knit as fabric made of loops offers space between threads hence, they have greater air permeability than woven fabrics. Woven fabrics offer great cover.

Knitted fabrics are more comfortable than woven fabrics, because of their stretch ability. They fit to the body shape and aid free body movement.

Knitted fabrics are bulkier than woven fabric. Knitted fabrics offer insulation and warmth and are popularly used to make winter sweaters.

Knitted fabrics have better resistance to wrinkles than woven fabrics.

4.5 KNITTING STITCHES

A knitting loop is called a Stitch. There are four basic stitches namely, Knit Stitch, Purl Stitch, Tuck Stitch and Miss Stitch.

4.5.1. **Knit Stitch**

It is also called plain stitch or face loop.

Purl Stitch

It is the reverse of the knit stitch. They are also called reverse knit stitch or back loop.

Tuck Stitch

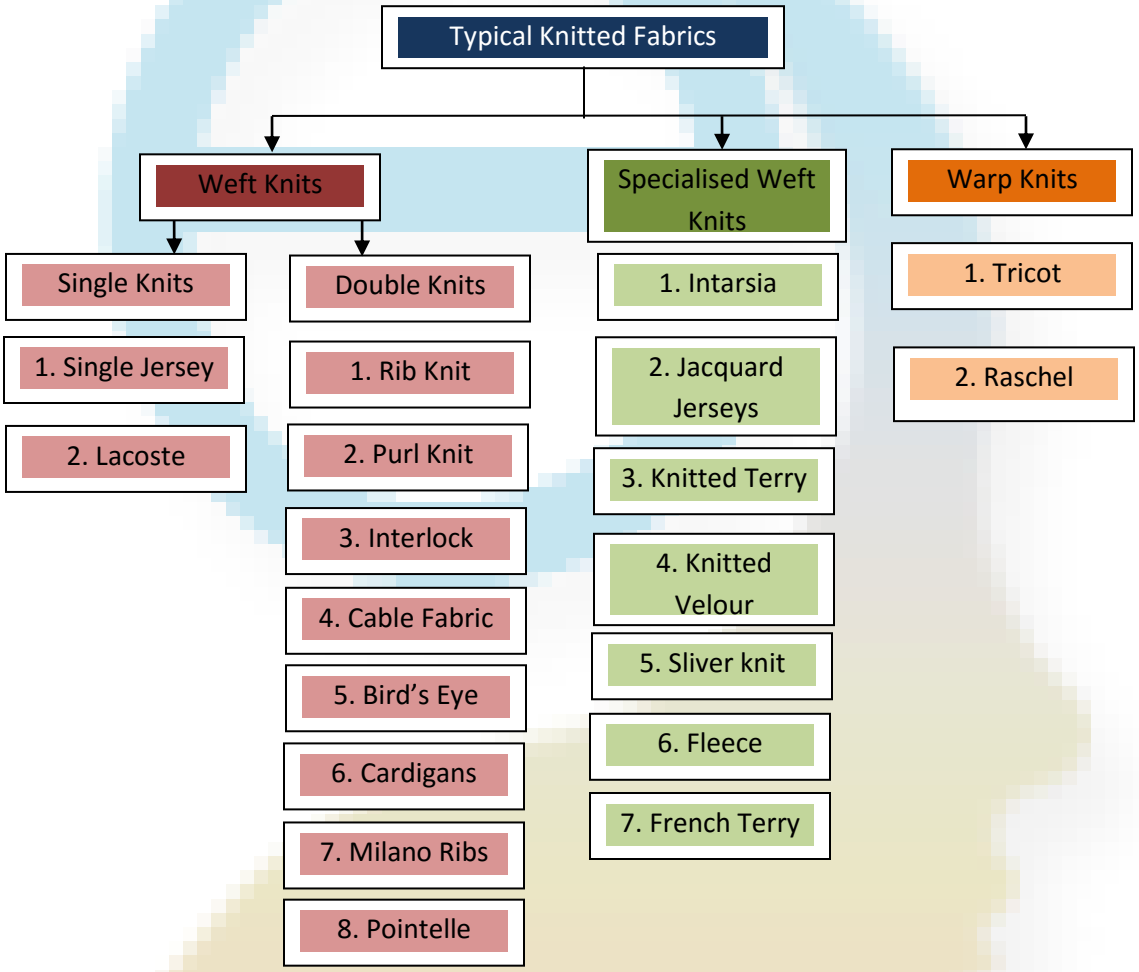
Tuck stitch is formed when new yarn is received without knocking over the old loop. It appears as an elongated stitch in the fabric. It creates an interesting texture in the fabric and contributes to fabric weight.

Miss Stitch

It is also called float stitch. It is created when two or more needles do not knit consecutively, leaving a trail of yarn instead of stitch. It is used to create amazing colours and designs in the fabric.

Combinations of these stitches form all knit fabrics of various textures.

4.6. TYPICAL KNITTED FABRICS

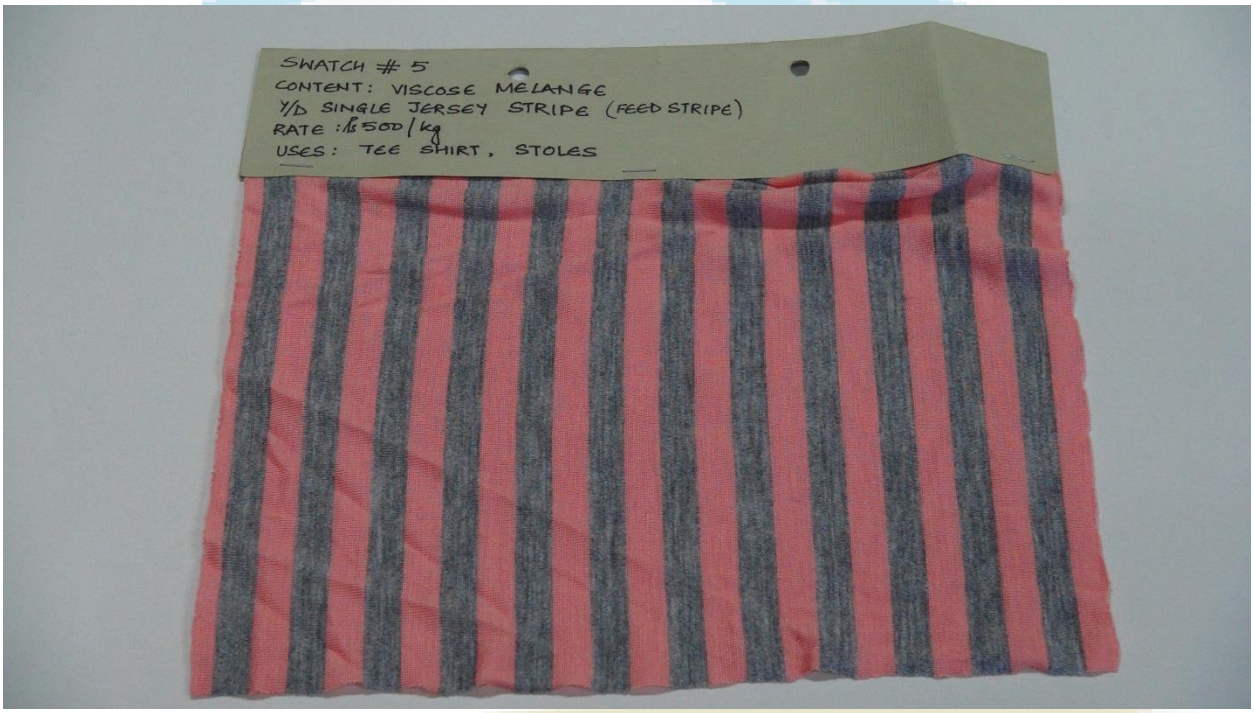


WEFT KNITS

Fabric is produced by forming one course after another. The loops in the fabric run horizontally one course after another. The fabrics are produced either in flat or tubular form. It may be produced by hand or machine. The fabrics have good stretch in length and width direction. Weft knitted fabrics may run and it is easy to unravel the yarn loops in the fabric.

SINGLE KNIT

Weft knitted fabrics made of one set of needles is called Single Knit or Jersey fabric. They have the simplest weft knitting structure. They are available in a wide range of thickness ranging from light hosiery to heavy sweaters with distinct patterns.



Single Jersey

Single knit or Single Jersey is formed when knitting is done with all the knitting loops drawn towards one side of the fabric. It is one of the fastest methods of fabric production.

Fabric has all knit loops on the face side and all purl stitches on the backside.

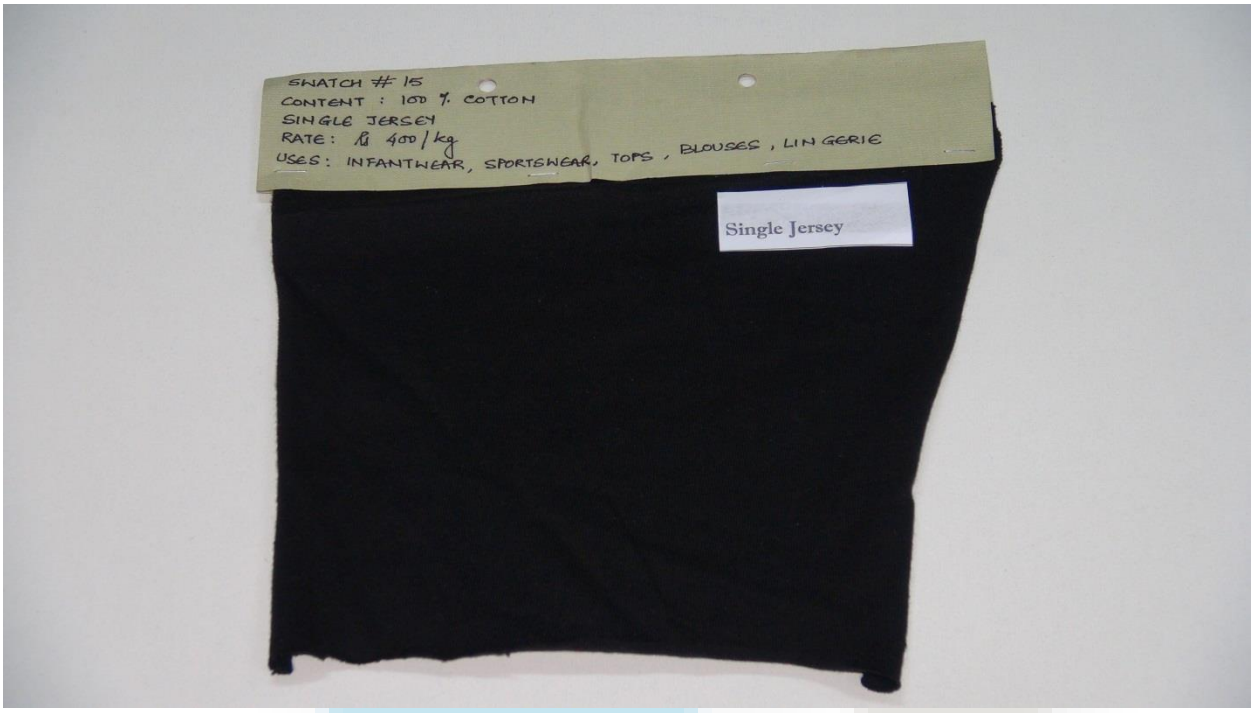
The fabric is irreversible with definite face side and backside.

The fabric stretches equally in both directions.

The fabric tends to curl at the edges. Fabrics tend to unravel, especially if made of filament yarns.

Fabric may be solid colour or produced with multi-coloured or fancy threads creating wonderful designs.

Single jersey fabrics are used for a range of uses, such as to make shirts, dresses, hosiery, underwear and sweaters.



Lacoste

It is single jersey fabric made with combinations of tuck loops and knit loops.

It is usually made in fine gauge where yarn loops are packed closely.

It is stable fabric with tuck stitches producing an interesting honeycomb effect.

It is widely used for making T-shirts.

DOUBLE KNIT

Double knits are weft knitted fabrics made with two sets of needle beds. The fabric structure is more stable and compact. The fabrics does not curl at the edges and does not ravel. They may be made with interesting designs and textures. One or two yarns are used to knit one course in the fabric.

Rib Knit

Rib fabric is made by knitting yarn as alternate knit stitch and purl stitch in one course of the fabric.

The fabric has alternate wales of knit and purl stitches.

It is reversible fabric, as they look identical on both sides of the fabric. They may be made with both flat and circular knitting machines.

The fabric has more stretch in the width direction. The fabric lies flat and does not curl at the edges hence, they are widely used for making collars, cuffs, waistbands and hats.

Purl knit

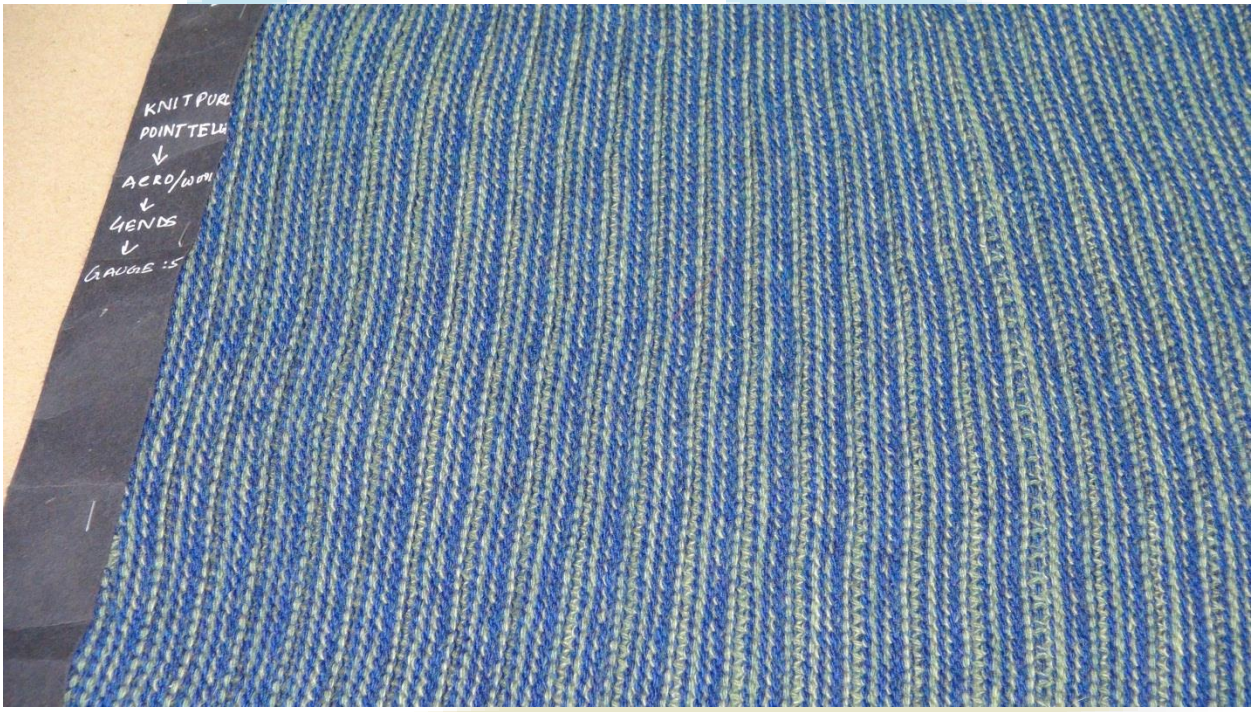
Purl fabric is made by knitting yarn as alternate knit and purl stitch in one wale of the fabric.

The fabric has alternate courses of knit stitch and purl stitch.

The fabric is reversible and identical on both sides of the fabric. The fabric does not curl and lies flat. It is more stretchable in length direction.

Purl fabric has three-dimensional effects, because of the alternate raised and sunken rows.

It is widely used in making infant wear and sweaters.



Interlock

The fabric is made in an Interlock knitting machine.

Two yarns forming loops in each course of the fabric knit the fabric.

It is as two-1X1 rib structure knitted together with loops placed exactly opposite to each other.

It is a strong, smooth, durable fabric having good dimensional stability.

It is widely used for making garments like blouses, dresses, T-shirts etc.

Since the fabric is smooth, it is ideal for printed garments.

Cable fabric

It is double knit fabric made by the special loop transfer technique.

The wales in the fabric have a rope like appearance, where plaits are based on the transfer of loops with adjacent wales.

The fabric has interesting surface texture like braids as the loops cross each other.

It is widely used as sweater fabric.

Bird's eye

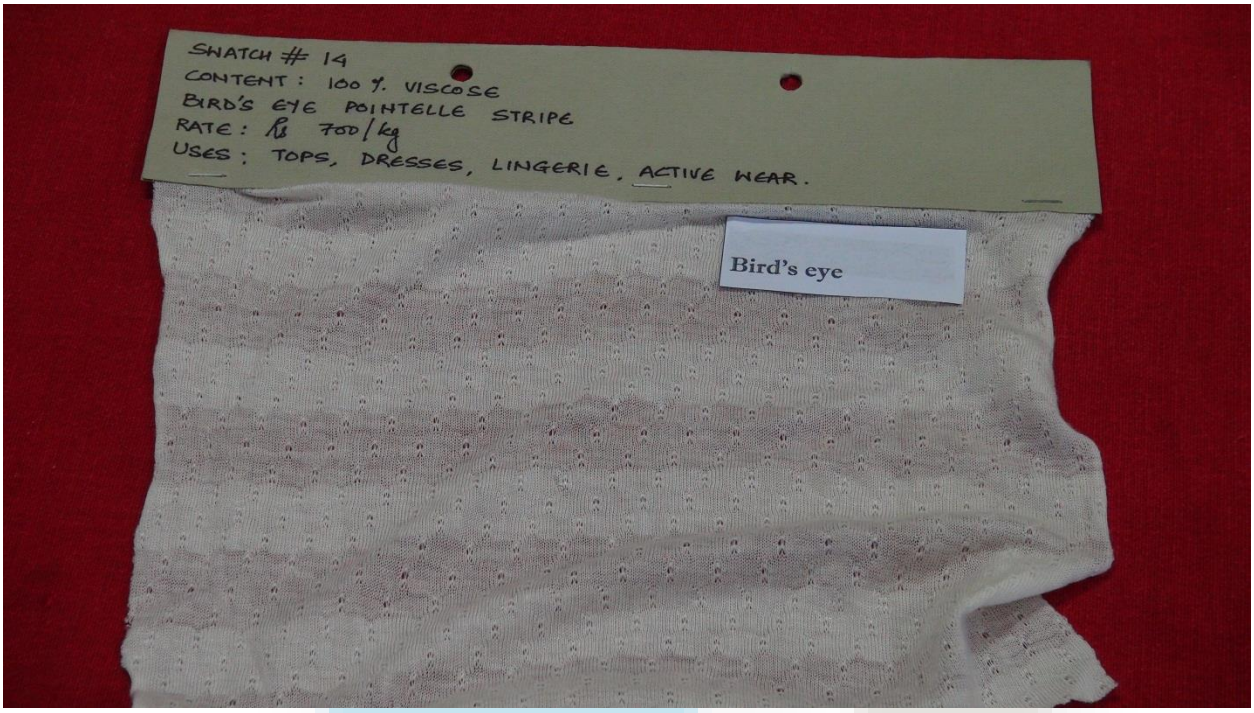
It is a double knit fabric with combination of tuck stitches along with knit stitches.

The tuck stitch creates interesting eyelet or hole effect on the fabric surface resembling a bird's eye.

Fabric is usually made of multi-coloured threads creating scrambling effect.

Fabric may be made with designs having eyelets.

They are a popular clothing fabric, especially women's wear.



Cardigans

They are half Cardigan and Full Cardigan.

They are types of Rib knit fabric.

The fabric has specific patterns of tuck stitches. These produce a raised effect and hence, cardigans are a thicker fabric.

Half cardigan is made of repeat of one course of all knit on both needle beds and second course of all knit on front needles and all tuck on back needles.

The tuck loops present in the fabric reduce the stretch in width direction.

It is not reversible fabric. They are generally coarsely knitted and used for making pullovers and sweaters.

Full Cardigan is made of repeat of one course of all knit on front needles and all tuck on back needles, second course of all tuck on front needles and all knit on back needles.

Full Cardigan looks identical on both sides.

Excessive tuck loops make the fabric bulky and thick.

It is usually knitted in coarser gauge and widely used in making sweaters and fashion garments.

Cardigans are usually made of Wool or Acrylic.

Milano Ribs

They are half Milano and full Milano.

Both are types of Rib fabric.

The fabric has specific patterns of knit and misses.

Half Milano is made of repeat of one course of all knit on both needle beds and second course of all knit on front needles only.

It has an unbalanced structure.

It is usually knitted coarse gauge and widely used for making sweaters.

Full Milano is made of repeat of one course of all knit on both needle beds, second course of all knit on front needles only and third course of all knit on back needles only.

Full Milano is finely knitted fabric and has better cover.

It has greater dimensional stability than half Milano rib.

It is widely used as suiting fabrics.

Pointelle

It is a type of double knit fabric.

The fabric has patterned miss stitches.

The fabric has looks like lace, with holes made by these transferred stitches.

The feminine look of the fabric makes it ideal for women's tops and kids wear.

4.7 SPECIALISED WEFT KNITS

Intarsia

It is patterned single knit fabric.

It is made of knitting multi-colored yarns. The fabric has the same course knitted in different colours with different yarns.

It has coloured designs as blocks distributed in different colour backgrounds.

The patterns look identical on both the face and backside of the fabric. There are no floats found on the backside of the fabric.

It is typically used to make shirts, blouses and sweaters.

Jacquard Jerseys

These are single jersey fabrics made in Circular Knitting machines using Jacquard mechanism.

They are the simplest method of making patterned fabrics.

They are produced with interesting patterns, which may have any of the following:

Combinations of stitches, or

Combinations of yarn types in terms of colour, textures etc.

Jacquard fabrics have different coloured loops made of different threads in the same course.

Floats are an inherent feature of single jersey jacquards.

They are widely used in the sweater industry.

Knitted Terry

Like in woven fabrics, these are pile jersey fabric made with a special attachment in regular circular knitting machines.

The fabric has loops on the fabric surface.

The fabric is made of two sets of yarns, in which one set of yarn makes the pile, while the other set of yarn makes the base fabric.

Knit terry is softer, more flexible and is more comfortable than woven terry fabrics.

However, they are not firm and durable as woven terry.

Owing to its softness and absorbency, it is widely used in beachwear, towels, bathrobes etc.

Knitted Velour

These are Pile jersey fabrics having soft protruding fibres on the fabric surface.

Like knit terry, they are also made of additional set of yarns making pile loops on the fabric surface.

However, in Velour, these pile loops are sheared evenly and brushed.

It may be dyed and generally available with solid colours.

They are used in luxurious apparels like jackets, blouses, dresses etc.

Sliver knit

It is Pile jersey fabric.

Unlike Velour fabric, Sliver knit fabric is characterised by a longer pile on the fabric surface.

It is made on special circular knitting machines in which the surface fibres imitating fur are attached to the fabric, by means of knitting sliver along with base yarn making the fabric.

Sliver knit fabrics have longer and denser piles on the fabric surface than other pile jerseys.

Animal printed sliver knit fabrics are popularly used as imitation fur fabrics. They are more popular than fur as they are light, more stretchable and do not require special care for storage.

They are widely used in making jackets and coats.

Fleece

It is a type of weft insertion jersey.

Weft insertion fabrics are weft knitted fabrics in which an additional yarn is inserted for each course.

These additional yarns are not knit, rather they are held by the loops in each course of the fabric. The inserted yarn may be decorative or functional like stretch yarn. It provides stability, cover and comfort. The insertion yarn is usually coarser than the base yarn.

When the insertion yarn forming piles is sheared and napped, it is called Fleece. They are usually made of Cotton, Cotton/Polyester, Wool and Acrylic.

End Uses include jackets, dresses, sportswear and sweaters.

French Terry

It is a type of Weft Insertion Jersey.

The piles on the fabric are not napped and the technical back of the fabric is used as face side.

French Terry has loops or piles on one side only. The piles of the French Terry are much shorter when compared to usual Terry. The fabric has excellent stretch and gives fleece like handle. These features make the fabric more comfortable hence, they are popularly used in clothing, especially infants and kids.

French Terry is widely used in sportswear, jogging suits and workout suits owing to its absorbency and stretch.

4.8 WARP KNITS

Warp knitted fabrics are made in a special knitting machine with yarns from warp beam. Unlike weft knits, they are knitted from multiple yarns, with yarns forming loops in adjacent wales. The fabric may be identified with a pick glass. The face side of the fabric has slightly inclined vertical knitting loops whereas the backside of the fabric has inclined horizontal floats. They do not ravel.

These fabrics are more stable than weft knits. They are available only as flat fabrics. Warp knits find applications in lingerie, sportswear, outerwear etc. Industrial applications of warp knits are increasing rapidly like reinforcements for civil engineering, medical applications like veins, tissue support fabrics etc. Warp knitting is one of the fastest methods of fabric production.

Warp knits are broadly classified as Tricot and Raschel.

Tricot

It is the most widely used warp knitted fabric.

The fabric is characterized with face side having vertical loops while backside having horizontal loops.

It is usually made of filament yarns. Tricot machines are fine gauge machines.

The fabric has the tendency to curl.

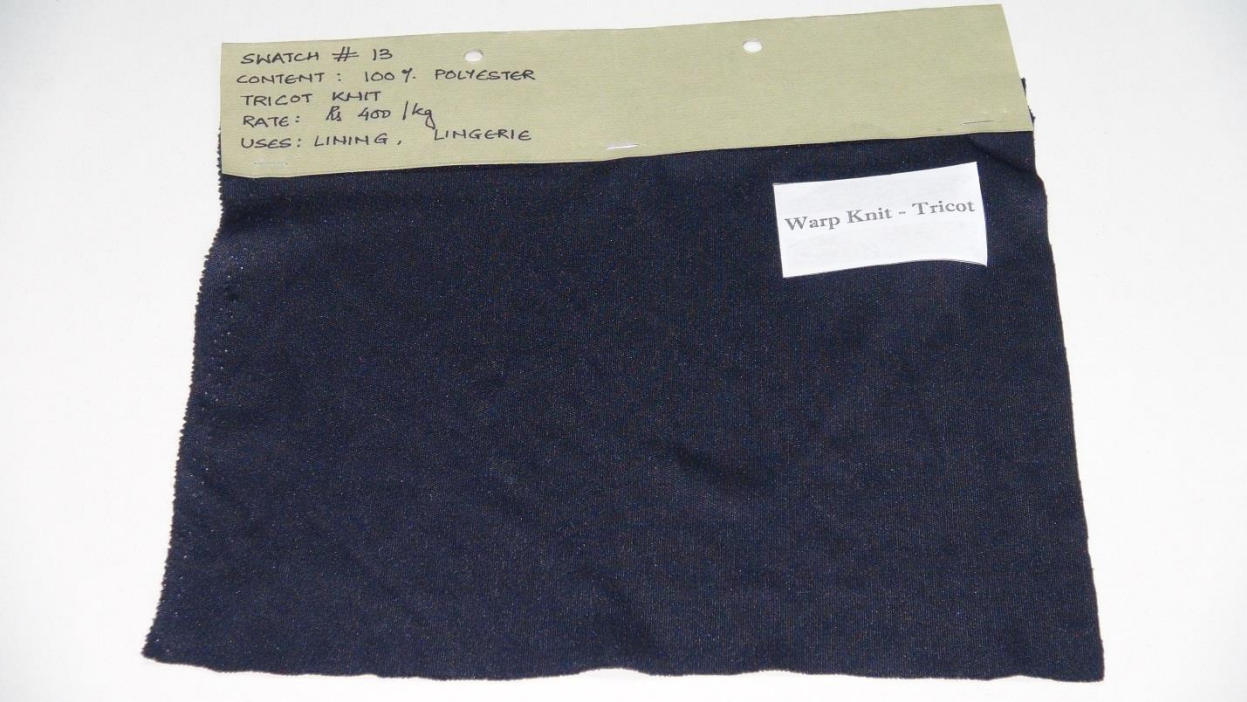
They are usually fine fabrics with simple geometric designs or without any surface texture.

As they are dimensionally stable like woven fabrics, they are widely used in clothing like shirts, slacks, lingerie and uniforms.

They are also used as interiors for automobiles and as backing for bonded fabrics.

Brushed Tricots are used in evening gowns, shoes and upholstery.

Tulle and Tricot net fabric is knit by skipping needles, leaving open hexagonal patterns. This is widely used in making veils and layers for apparel.



Raschel

The principle of Raschel knitting is the same as Tricot knitting.

Raschel fabric is characterized with chains of loops connected to each other with laid in yarns.

These machines have gauges ranging from laces to blankets.

They are known for producing fascinating surface textures. They are open constructed.

Carpets are also made by Raschel knitting owing to their high speed of production, thus reducing the cost of production.

Light to heavy; intricate and complex laces are made by Raschel knitting.

Some of the popular end uses include lace, swimwear, foundation garments, thermal wear, draperies, dresses etc.

4.9 Conclusion

To summarize, this unit, gave you an overview of different types of knitting.

You have also learnt about the differences between weaving and knitting and the various knitting stitches and typical knitted fabrics.

Finally, you also learnt about weft knits, single knits, double knits and specialised weft knits.