

Subject: Fabric Studies

Unit 2 – Woven fabrics

Quadrant 1 – e-Text

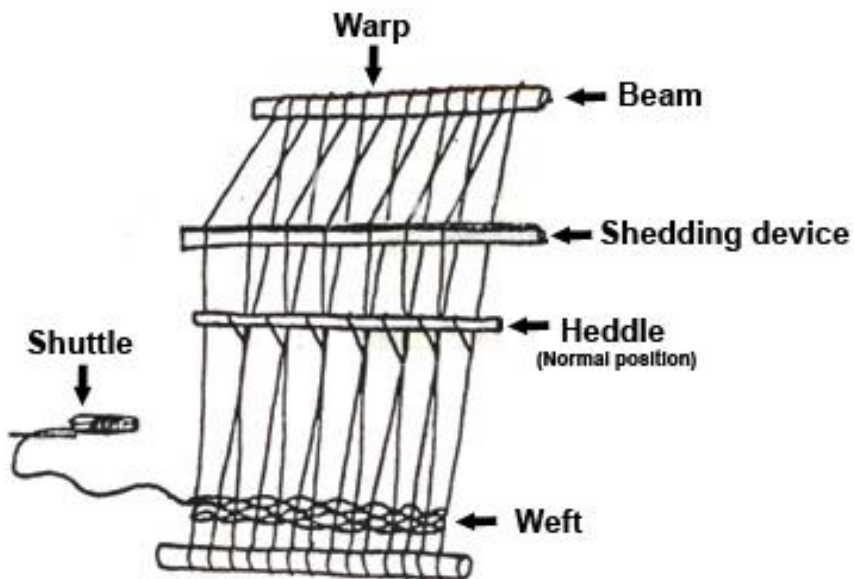
Learning Objectives

The learning objectives of this unit are:

- Define woven fabrics.
- Describe the following basic motions of weaving.
- State the 3 types of fabric weaves and its derivatives.
- Classify woven fabrics based on their weight.
- Identify and describe light weight, medium weight and heavy weight fabrics.
- State the uses of these fabrics.

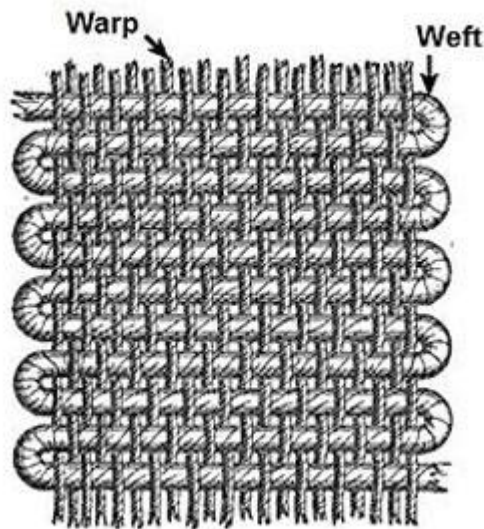
2.1 INTRODUCTION

Woven fabrics are made in a machine called a loom by interlacing warp and weft perpendicular to each other.

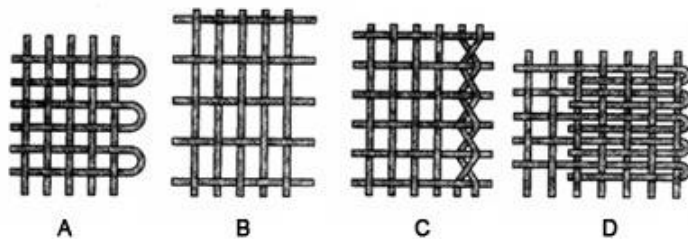


Woven fabrics are made with a variety of textures by having combinations of interlacement of threads. They are formed by the process of weaving involving three basic steps namely, shedding, picking and beat up.

Shedding is the process of separation of warp threads by heald shafts according to the order of interlacement of threads. The process of shedding creates the space between the threads through which pick or weft is inserted. The process of insertion of weft is known as picking. The newly inserted weft is beaten up to the already woven cloth thus, making a compact fabric.



The warp yarns are parallel to the fabric edges called the selvages. Selvages are more compact than the body fabric which runs along the length of the cloth for about a quarter to half inch width.



- a) Shuttle loom b) shuttleless loom with fringe c) leno d) tucked-in

2.2 BASIC FABRIC WEAVES

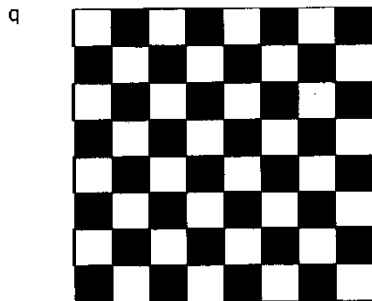
The order of interlacement of threads in a fabric is called weave. When there are no interlaces and the yarn runs over 2 or more threads, it is termed as float. There are three basic weaves which form the basis for almost all types of existing fabrics. They are:

1. Plain Weave
2. Twill Weave
3. Satin Weave

Plain weave:

It is the simplest weave. It is formed by alternate interlacement of every warp and weft yarn. Plain woven fabrics have maximum possible interlacement in the fabric thus, producing strong fabric. It is made in a wide range of thickness with different characteristics. Plain woven fabrics are flat and smooth. Both sides of the fabric look similar and is the ideal weave for end products, which require surface manipulations like printing and embroidery.

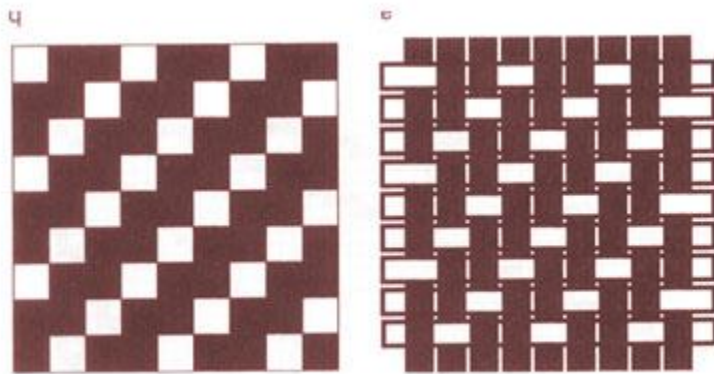
The interlacement of threads in a plain woven fabric is represented as shown below:



Some of the typical plain woven fabrics are muslin, chiffon, georgette etc.

Twill Weave:

The twill woven fabric is formed by interlacing each warp across two or more weft yarns or vice versa, forming prominent diagonal lines. These fabrics are irreversible, having a technical face and back. The diagonal lines reverse in direction i.e. if it goes left wise on face side of the fabric it would go right wise on the back side of the fabric. They are durable, and have interesting surface texture as well as luster, owing to the diagonal lines. They are flexible and wrinkles recover better. They are generally used for work wear, due to their sturdy look and less soiling.



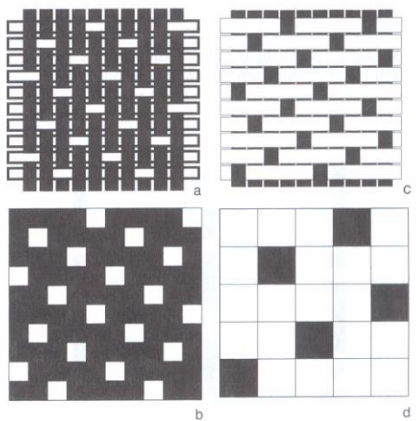
Right handed twill weave

Some of the typical twill woven fabrics are denim, houndstooth etc.

Satin weave:

Satin weave is formed by long floats with minimum interlacing among yarns in the fabric. The simplest satin weave has interlaces in the fabric for every warp over four weft yarns. The floats in the fabric have progression of two, either in the left or right. There are also fabrics where interlacing occurs over seven or eight yarns. Long floats in a satin fabric, make it lustrous and smooth. It has got good wrinkle resistance.

Sateen applies to weft faced Satin weave. It is usually made of low twist cotton spun yarns and does not possess lustre like Satin.



Lower interlacing in twill and satin fabrics allow more yarns to be packed per unit area making it a flat, compact fabric with good drape.

2.3. TYPICAL WOVEN FABRICS

Woven fabrics are found to be the most widely used variety of fabrics for day-to-day life for clothing, home furnishing and industrial products. They may be categorized as light, medium and heavy weight fabrics, according to their thickness and heaviness. Fabric weight is generally expressed in terms of grams per square metre (GSM) or ounces per square yard. It describes how much a fabric weighs for a given unit area.



2.4 LIGHTWEIGHT FABRICS

The fabrics which are very thin and light fall under this category. They are fabrics of weight less than 4.0 oz. / square yard. These fabrics if made of natural fibres are softer and more comfortable. They possess good drape. They are used for making tops like shirts, blouses, dresses, linings and home furnishings like bed sheets, sheer curtains etc.



Calico

It is plain woven cotton fabric.

The fabric is flat, crisp and smooth. It is ideal for printing.

Calico is characterised by small attractive print designs on contrasting colour backgrounds.

It is used in making dresses, blouses, curtains, bed spreads, wall coverings, cushion covers etc.



Chiffon

It is one of the most sheer plain woven fabrics.

It is a very thin fabric and appears transparent to semi-transparent.

Originally, Chiffons were made in Silk, but are now being replaced by hard twist synthetic filament yarns.

The fabric is smooth and has shine.

The texture and excellent drape of the fabric makes it ideal for apparel.

Popular end uses include evening gowns, blouses, scarves etc.



Crepe

It is a fabric showing no prominent weave effect, but has a crinkled or pebble surface.

It is plain woven fabric made of very high twist yarns, either in one direction or both warp and weft hence, giving the pebble effect. It may be manufactured in the range of light to medium weight.

The fabric has silk like texture and drapes well.

It is used for making dresses, blouses, linings, scarves and in home furnishings too.



Gauze

It is sheer and open constructed fabric with more spaces between the threads than regular fabric.

It is made of plain weave.

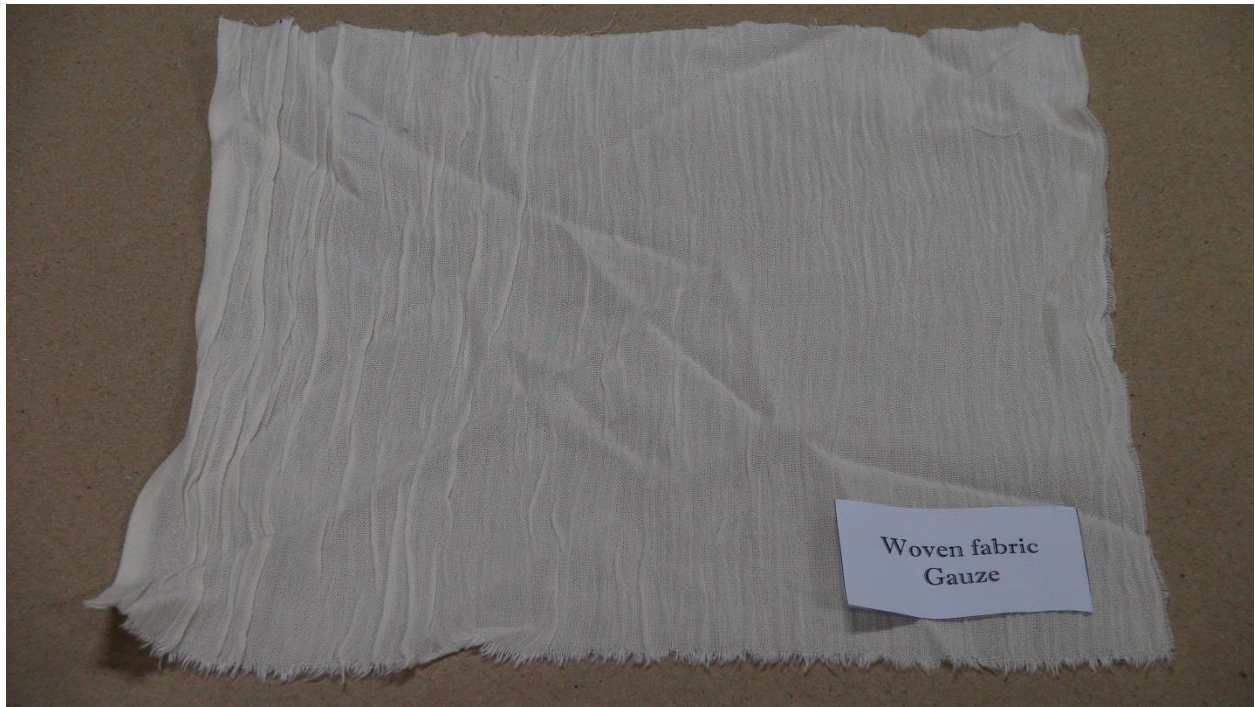
Gauze fabric is usually made of cotton, rayon or their blends.

It is made using spun yarns and has soft texture.

They are not strong hence, are not suitable for durable applications.

It is used in apparel, home furnishing like curtains and is popular in medical uses for bandages.

Indian Gauze has a crinkled look with varied thickness.



Georgette

It is a type of crepe fabric with puckered surface.

Georgette is light sheer fabric. Like Chiffons, georgette was originally made with Silk and is now being replaced with crepe twist filament yarns.

In georgette fabric, the yarn twist direction (S or Z) reverses for every alternate warp and weft creating the puckered effect.

Like Chiffon and Crepe, Georgette being light weight, drapes well. However, Georgette has a dull look when compared to Chiffon.

It is widely used in apparel like blouses, evening gowns etc.



Organdy

Organdy is the most sheer and stiff cotton fabric.

It is made of fine spun combed yarns.

The fabric is characterized by stiffness and crispness. The fabric is crisped by a special process known as ***Parchmentizing***.

In this process, fine plain woven cotton fabric is treated in an acid solution which dissolves the fabric, under the control of strict process parameters.

The fabric hardens as a transparent and stiff cellulose film. It is then neutralized with alkali and washed.

This permanent effect makes the stiff and transparent organdy fabric.

Most stiff varieties are used in home furnishing fabrics like curtains and softer Organdy varieties are used in summer wear like blouses, saris etc.

Organza

Organza is also sheer and stiff plain woven fabric as Organdy.

It is made of silk or man made filament yarns, instead of cotton in Organdy.

They may be printed or used in solid shades.

They were originally made as Silk fabrics, but now are made using man made filaments such as Nylon or Polyester.

The fabric is crisp, smooth and lustrous. It is best suited for apparel categories like evening and bridal gowns. Viscose and acetate Organza are used for making decorative curtains.



Oxford Cloth

It is cotton fabric made of soft fine yarns.

The fabric is made of rib weave.

Usually, 2X1 basket weave, also called as half basket weave is employed.

Oxford fabrics are also found in other basket weaves like 3X2 basket weave. Since, basket weave is a loosely constructed weave, the fabric is porous.

Fine and closely packed warp and coarser weft makes the fabric lustrous.

It is the most popular shirt fabric.



Seer sucker

It is classified as puckered fabric.

It is made in a wide range of thickness from light to heavy.

It is made using special type of weaving with two sets of warp yarns with varying tension. This creates a permanent puckered effect.

The fabric is usually made of cotton and generally, has multi-coloured stripes or checks.

The fabric has alternating vertical stripes of flat and puckered sections.

End uses include shirts, dresses etc.



Voile

It is sheer plain woven fabric.

It is crisp fabric usually made of Cotton. Nowadays, they are made with different fibre contents.

The fabric gets its texture from the unique variety of threads used for weaving the fabric.

It is made of very fine, highly twisted combed yarns.

Sheer cotton texture makes it ideal for ladies wear like blouses, and dresses and for draperies.



2.5 MEDIUM WEIGHT FABRICS

These are fabrics of weight from 4.0 square yard to 6.0 square yard. Medium weight fabrics are the most widely used woven fabrics. They are used for heavy shirts, blouses, dresses, apparel linings, winter bed sheets, draperies, upholstery, wall coverings and table linens. They are also used to make quilted and bonded fabrics too.

Chino

It is a compact twill woven fabric and is usually made of Cotton.

The fabric has slight lustre.

As the fabric is durable it began to be used to make military uniforms.

They were manufactured in shades of brown, but are now available in other shades too.

Popular end uses include uniforms and trousers.

Denim

It is twill woven cotton fabric.

Twill weave which makes the popular denim is 1/2 or 1/3 warp faced twill.

Its durability makes it one of the popular fabrics for work wear and pants.

They are well-known fashion fabrics for all ages.

It may be classified as yarn dyed fabric as the warp is usually coloured while the weft yarn is white or grey cotton.

The traditional colour of denim is Indigo, but it is now available in similar shades.

Denim fabrics are now also available as brushed, printed, faded or washed with interesting design effects.

The fabric is also produced with Spandex yarns producing fashionable stretch to fit slacks.



Drill

It is twill woven fabric with a well-pronounced diagonal line.

It is a strong and durable cotton fabric. The fabric is ideal for work wear like military uniforms etc.

Drill is popular as Khaki fabric when produced in that particular shade.

They are used as sailcloth, upholstery, tents and sneakers.



Flannel

It may be classified as brushed fabric with soft fibres protruding on one or both the fabric surface.

Originally, flannel was made of wool, but now it is made of cotton, wool or any other synthetic fibre.

It is produced in a wide range of thickness ranging from light to heavy.

Heavier woolen fabrics drape well and is ideal for tailoring. They are also more resistant to wrinkle and hence, are suitable for suiting and shirting.

They are either plain or twill woven.

Popular end uses include ladies shirts, jackets, bedspreads and pajamas.

Flannels with Plaids and Tartan weaving patterns are popular.



Gabardine

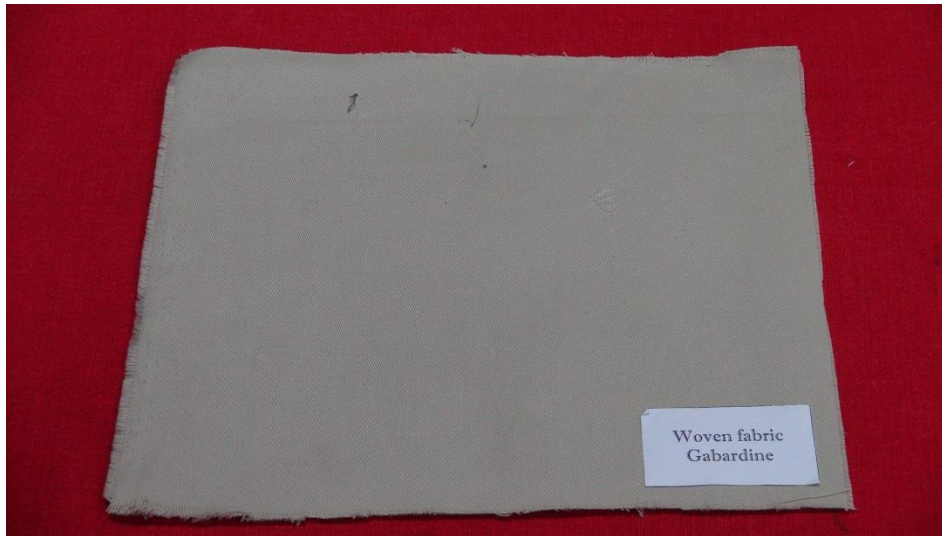
Gabardine is twill woven worsted or cotton fabric.

It is made of warp faced regular or steep twill. Warp faced twill fabrics are strong and durable as warp yarns have higher twist and are packed more than weft yarns.

The twill line is fine, prominent and the fabric is available as brushed and raised.

The fabric is available in various surface designs like heather (multi-coloured fibre), stripes, checks, plaid or solid color.

Since the fabric is durable, gabardine is widely used in making pants, shirting and suiting.



Muslin

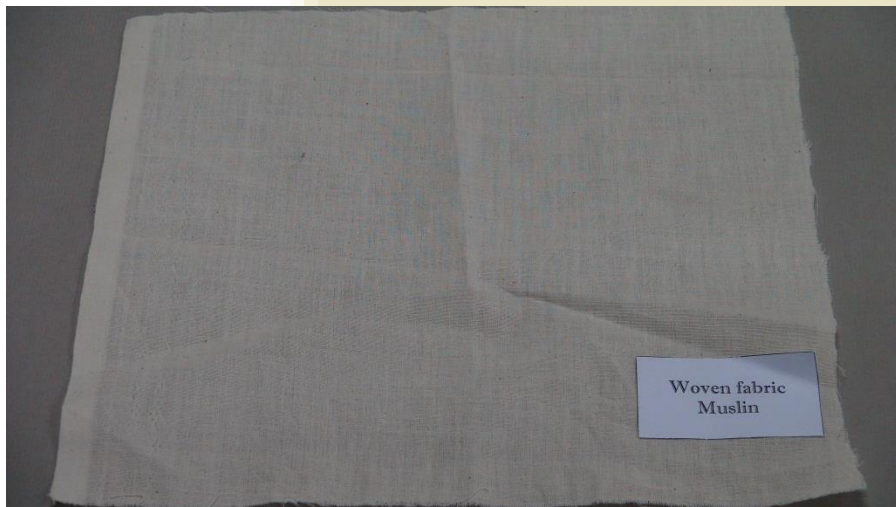
It is plain woven cotton fabric.

It is available in a wide range of thickness ranging from light weight to heavy bed sheeting.

It is stiff fabric made of unfinished cotton. The fabric has black, speckled effect, because of trash content such as broken seeds and twigs that are left in the fabric.

Unfinished muslin is widely used as designer sample garments and interfacing.

When muslin fabric is processed and free from starch and oil, the fabric is soft. It is used for apparel like dresses and home furnishings like sheets and upholstery.



Poplin

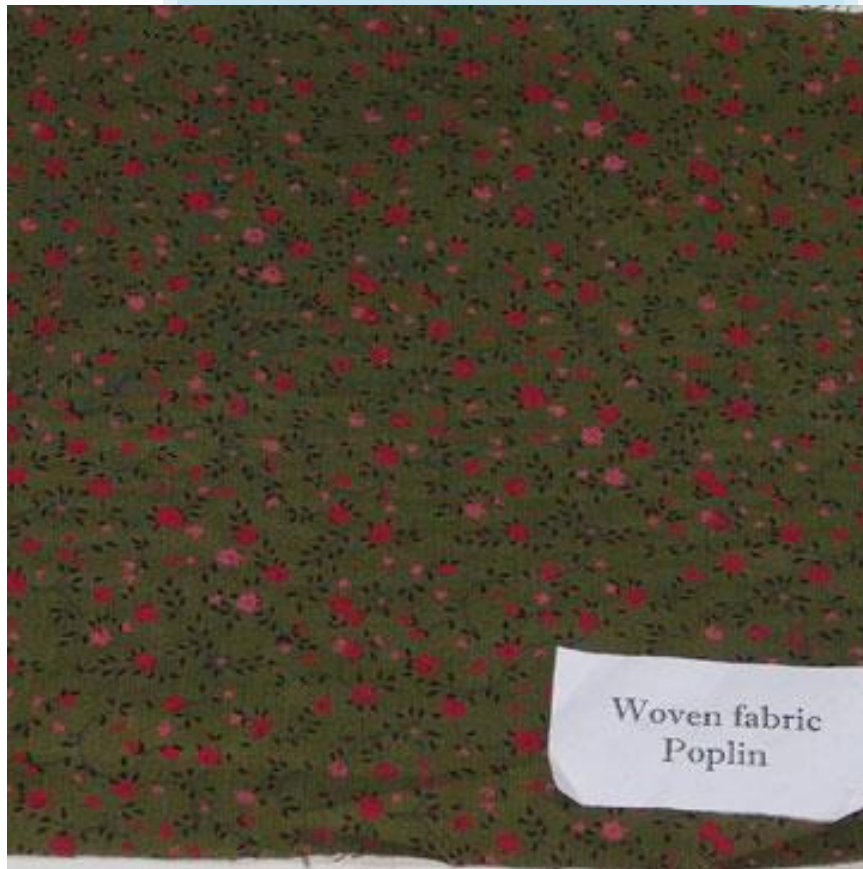
It is plain woven fabric.

It is fine, horizontal ribbed fabric. The ribs are heavy and prominent as coarse weft yarns are used.

It is made as cotton fabric and Polyester/Cotton blend too is widely used.

Poplin fabric is usually available in solid colours.

Poplin is popular in apparel like jackets, raincoats, shirts etc.



Satin

It is warp faced fabric of satin weave.

The fabric is made of closely packed filament yarns.

The fabric is smooth on the face side and dull at the back.

The fabric is characterised by long floats, low twist yarns and is highly lustrous.

The fabric is strong, durable and firm.

It is made in varying thickness and used in wide range of apparel categories like dresses, linings, lingerie and in home furnishings like draperies, drapery linings and upholstery.

Satin fabric is flexible and more durable than taffeta. It is thus suitable to be used as lining fabric.



Shantung

It is plain-woven fabric.

The fabric is usually made of raw Silk or silk like synthetic fibres.

It is made of fancy slub yarns, which creates a rib effect along the weft direction.

The fabric has rough texture with sheen.

The end uses of fabric include women's wear like bridal gowns, dresses etc.



Taffeta

Taffeta fabric may be made of plain weave or ribbed plain weave.

Ribbed weave is characterised by fine cord effect. Ribbed plain weave is an extension of plain weave in either warp or weft direction. Generally, ribbed fabrics have more yarns in one direction than the other.

Taffeta is made of filament yarns which give lustre to the fabric. Usually, Taffeta has almost double the number of warp yarns as weft yarns.

The fabric is compact and crisp. The fabric on handling has a slippery rustle.

Varieties of taffeta include, different colours in the warp and weft direction giving it a shimmering effect.

Taffeta is used for making ladies garments like dresses, blouses, suits and lining fabrics.

Types of Taffeta include: Antique taffeta, Moire taffeta, Faille taffeta, Paper taffeta, Tissue Taffeta.

Antique Taffeta made of novelty yarn i.e. Slub weft yarn

Moire Taffeta has a watermark design.

Faille taffeta has prominent ribs in the fabrics

Paper taffeta is lightweight taffeta fabric with crisp hand.

Tissue taffeta is lightweight transparent taffeta fabric.



2.6 HEAVY WEIGHT FABRICS

These are fabrics weighing more than 6.0 oz. / square yard. As the name suggests, these fabrics are strong and heavy and are used for durable applications. They are also called as suiting-weight fabrics as they are popular suiting fabrics. They are widely used as outerwear, work wear, slacks, upholstery and industrial fabrics.

Canvas

It is a cotton fabric known for its durability.

The fabric is made of basket weave, a derivative of plain weave, where two or more yarns follow the path of warp and weft as in plain weave. It may also be explained as extension of plain weave in both warp and weft direction.

Canvas is more smooth and compact.

Basket woven fabrics are flatter and more flexible than usual plain weave.

Owing to its heaviness it is not preferred for apparels. It is widely used as shoe fabrics, house and store awnings, tents etc.



Serge

It is worsted twill woven fabric.

The fabric has distinct diagonal lines made of 2/2 twill weave.

The fabric is usually made compact with closely packed fine yarns.

The fabric is durable and has lustre. Regular wear makes the fabric lustrous and is found to be ideal for suiting materials.

The fabric is widely used for making coats, jackets, slacks and suits.

They are also given water repellent finish and used as rain coats.

Tweed

It is a fuzzy woolen fabric with protruding fibres on the fabric surface.

It is usually made of twill weave or its derivatives.

The fabric has a dull look owing to woolen yarns.

It is usually constructed with multi-coloured fancy yarns.

Varieties of tweed include Donegal Tweed, Harris Tweed, and Irish Tweed.

Tweed being firm, heavy fabric is a popular fabric used in coats and suits.

Donegal Tweed is plain woven tweed with multi-coloured slub or seed yarns.

Harris Tweed is tweed fabric from Scotland and is widely used in sports jackets.

Irish tweed is tweed fabric from Ireland with distinct coloured weft and white warp.



2.7 Conclusion

To summarize, in this unit, you have learnt about Basic Fabric Weaves including Plain Weave, Twill Weave and Satin Weave.

You have also learnt about Typical Woven Fabrics, including different kinds of Light Weight Fabrics, Medium Weight Fabrics and Heavy Weight Fabrics.