



UNIT X
TEXTILE FABRICS

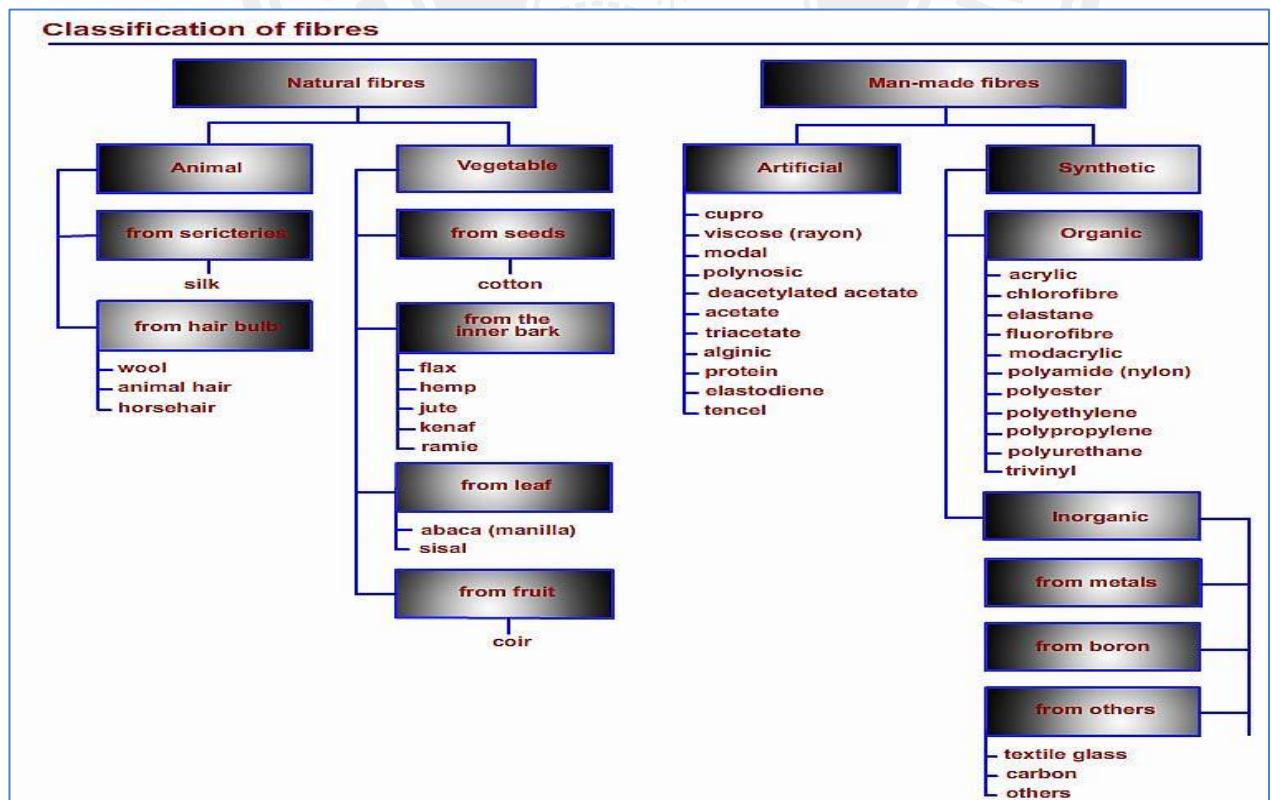
SOLUTIONS

TEXTUAL QUESTIONS AND ANSWERS

Q1. What are the differences between filament and staple? Give the classification of fibres.

Ans: **Filament fibres** are measured in yards or meters. Silk and all man-made fibres are filaments. Yarns made of filament fibres are of two types, Mono and Multi filament. Mono filament yarns are made up of single solid strong and smooth strain. Multi filament yarns are composed of a number of tiny filaments twisted together. Yarns of multi filament contribute towards smoothness, softness, lustrous texture whereas any fibre with a practical limited or finite length is call staple fibre. These are small length fibre like cotton, wool, jute etc. it may be natural (cotton) or man-made (viscose rayon, polyester). Staple fibres are measure in inches or centimetres. These include almost all natural fibres except silk. However man-made fibres are cut into short lengths and known as **Staple fibres**.

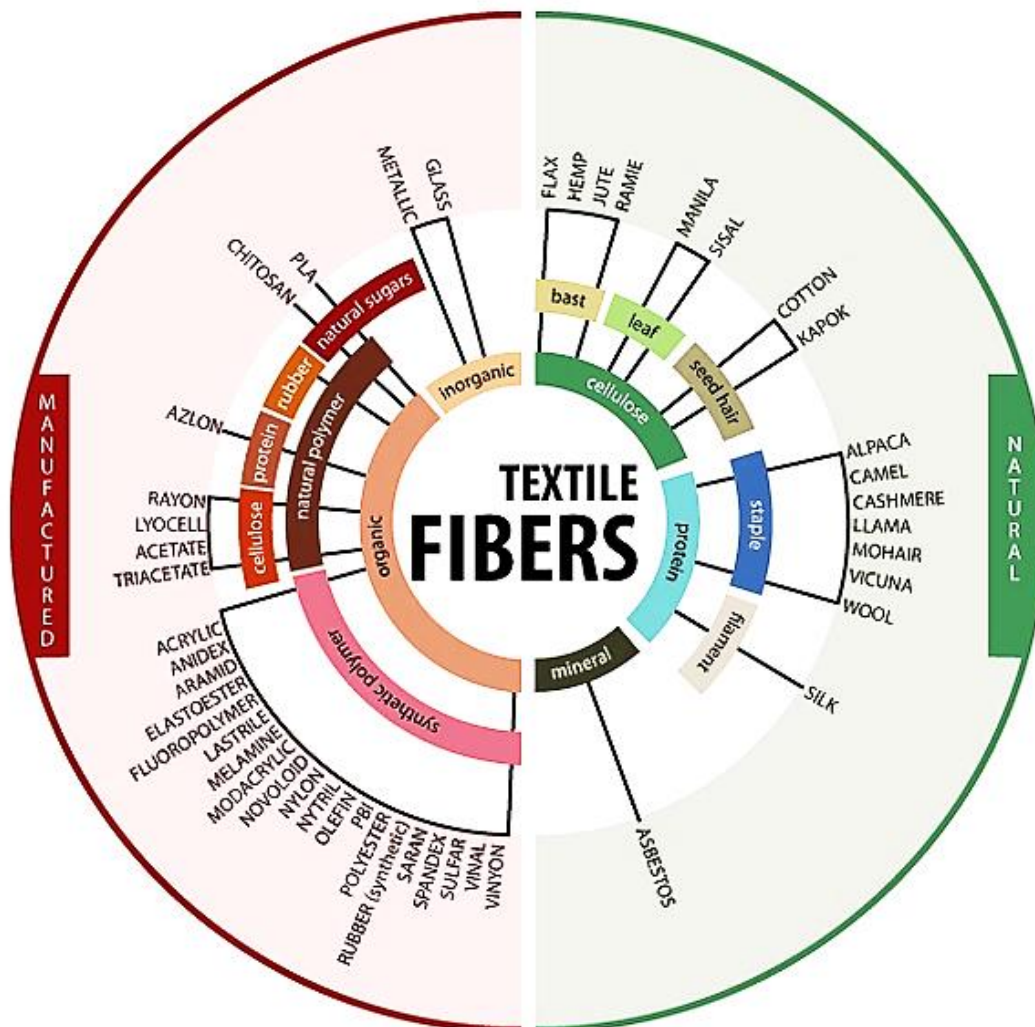
The classification of textile fibres on the basis of their origin is as follows:





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* Generic classification based on chemical composition as defined by the Textile Fiber Products Identification Act. (Manufactured Category)

Q2. Compare the properties of cotton and silk.

Ans: Cotton is the staple and most widely used textile fibres. The natural twist makes it a strong fibre. It is seen flat and twisted like a twisted ribbon under the microscope. It has low elasticity, easy to wrinkle when wearing (hard to recover after wrinkle). It can withstand high temperature, boiling water and frequent laundering. Cotton is a good conductor of heat, it does not take in dyes as readily as silk or wool. It is sensitive to the action of acid.

On the other hand, Silk is a filament and it has double rod like structure under the microscope. Silk fibre is easier to dry than cotton; low shrinkage, full of elasticity. It is smooth and comfortable to wear without static electricity and pilling. Silk had an excellent sewing and draping qualities. Dye stuffs are absorbed by silk. It is poor conductor of heat. Strong alkalis have a harmful effect on it.



Q3. Write in detail the properties of wool.

Ans: Wool is a staple fibre. They are composed of amino acids. Under the microscope a wool fibre resembles a worm with horny scales. They are bad conductor of heat hence woollen garments keep the body warm. Woollen fibres have excellent absorbency. They have poor resistance to alkali and good resistance to acids. They also have good elasticity and resiliency.

Q4. List the natural fibres and give the characteristics of any one natural fibre.

Ans: For classification see answer to Q1

For characteristic of natural fibre see answer to Q2&3

Q5. What are textile fibres?

Ans: There are two types of textile fibres namely natural (e.g. silk) and man-made fibres (e.g. cotton, wool, silk, polyester, nylon, etc.) which are used for making textile yarns and fabrics.

Q6. Why wool is advised for winter use?

Ans: Woollen clothes keep us warm during winter because wool is a poor conductor of heat and it has air trapped in between the fibres.

Q7. Write short notes on-

(a) Structures of cotton/silk/wool/nylon.

Ans:

Cotton is a soft, fluffy staple fibre that grows in a ball, or protective capsule, around the seeds of cotton plant. The fibre is almost pure cellulose. Under natural condition, the cotton balls will tend to increase the dispersion of the seeds.

Silk is a natural fibre which is obtained from the cocoons of the silkworm. It is a natural filament produced by the salivary glands of silkworms, which are a type of moth that feeds on the mulberry bush.

Wool fibre is the natural hair grown on sheep and is composed of protein substance called as keratin. Wool is composed of carbon, hydrogen, nitrogen and this is the only animal fibre, which contains sulphur in addition.

Nylon is a generic designation for a family of synthetic polymers, based on aliphatic or semi-aromatic polyamides, based on aliphatic or semi-aromatic polyamides. Nylon is a thermoplastic silky material that can be melt-processed into fibres, films, or shapes.



(b) Cotton keeps us cool, how?

The heat energy from the body is absorbed leaving the body cool. Cotton being a good absorber of water helps in absorbing sweat exposing to the atmosphere for easy evaporation. To absorb sweat, to make us feel cool and let the air pass we wear cotton clothes in summer.

Q8. Define Yarn.

Ans: Yarns are made up of strands called fibres. The process of making yarn from fibres is called spinning. It is used for sewing, knitting and weaving.

Q9. Explain in detail the classification of yarn.

Ans: All textile yarns are classified according to structure, or how they are made. In general, there are three basic classifications of yarn simple yarn, novelty yarn and textured yarns.

1. Simple yarn or ordinary yarn: A simple yarns are characterised by uniform size and surface. They can be broadly divided into single ply yarns, multi ply yarns and cord or cable yarns.

- i. **Single ply yarns-** These are used for making fabrics and are stronger as these are highly twisted.
- ii. **Multiply yarns-** This yarns are made up of spinning together two or more than two single yarns.
- iii. **Cord or cable yarns-** This yarns are made by two or more ply yarns together.

2. Novelty/ fancy/complex yarns: They are made on spinning machine with special arrangement for giving different tensions and rates of delivery to the different ply to allow loose, curled, twisted or looped areas thus creating patterns in the yarns.

There are different types of novelty yarns-

- i. **Grandrelle yarns:** They are composed of two or more different coloured threads twisted together.
- ii. **Spiral yarns:** They are composed of two threads twisted tightly together round which a soft spun thread is twisted spirally.
- iii. **Gimp yarns:** It consists of a fine foundation thread and a soft spun thick thread, which is given in more rapidly than the centre thread.



- iv. **Curl/loop yarn:** It consists of a fine foundation thread, a soft spun thick thread which forms loops at intervals and fine binder thread.
- v. **Knop or knot yarns:** These are composed of one or two foundation threads which are twisted with a thread but the latter, at intervals, is wrapped round and round the former to produce lumps or knops.
- vi. **Cloud, slubs or flake yarns** are composed of two foundation threads with which piece of short fibres twistless silvers are twisted at intervals.

3. Textured yarns- It may be either filament or staple fibres. The three types of textured yarns are stretch, modified stretch and bulked.

- i. **Stretch yarns:** These yarns have extremely high levels of elastic extensibility and recovery.
- ii. **Modified stretch yarns:** These yarns have some degree of stretch but they have been stabilized by processing to control the stretch.
- iii. **Bulked yarns:** These are special textured yarns designed to contribute bulk to the fabrics. These yarns have moderate to low levels of stretch and they have fluffy, bulky properties. Most textured yarns are manufactured from thermoplastic fibres. They can be made into bulky, fluffy or somewhat smooth and fine.

Q10. What is simple yarn? How are simple yarns classified?

Ans: Simple yarn is a strand of fibres all twisted in the same direction. No decoration elements are introduced into yarns during spinning. According to the number of strands present in the yarns, simple yarns have been further divided into three sub classes.

- (i) **Single ply yarns**
- (ii) **Multi ply yarns**
- (iii) **Cord or cable yarns.**

Q11. Write the differences between “S” and “Z” twists in yarns.

Ans: The “S” twist- the right hand and clockwise and the “Z” twist- the left hand and counter clockwise.



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Q12. Elaborate the word t.p.i.

Ans: t.p.i means number of **twists per inch**. It is a term used in the textile industry. It measures how much twists a yarn has, and can be calculated by counting the number of twists in an inch of yarn.

Q13. Study the fabric constructed from complex yarns.

Ans: This is for student activity.

Q14. How do the different types of complex yarns influence the texture and service quality of clothes?

Ans: Complex yarns are uneven yarns which may be thick and thin or have curls, loops, twists and even differently coloured areas along their length. This looks of the yarns are used to add interesting effects in fabric.

The different types of complex yarns such as- Grandrelle yarns, Spiral yarns, Gimp yarns, Curl or loop yarns, knop or knot yarns and cloud, slub or flake yarns produced fascinating designs on the fabric depending on the counts, colours and different materials used in making the yarn. Complex yarns provide the textile designer with lovely attractive to traditional looking items. Even the most experienced weaver, knitter or crocheter will find brand new choices. By using complex/novelty yarns, one gets into a process of creating a beautiful product at a reasonable price.

Q15. Explain the structure of basic loom.

Ans:

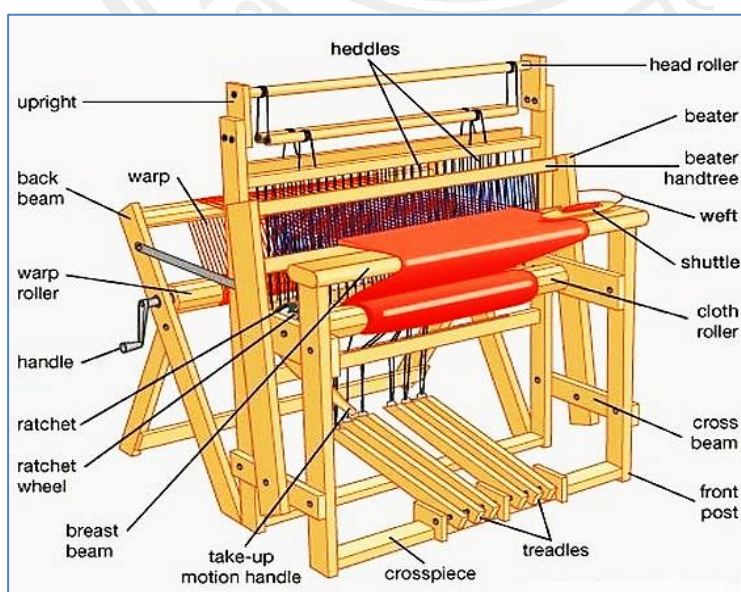


Fig: A basic loom



The parts of a basic loom are as follows:

- (i) **The warp** beam holds the lengthwise yarns. It is located at the back of the loom and is controlled so that it releases yarn to the loom as it is needed.
- (ii) **The Heddles** are the wires or metal strips with an eye located in the centre through which the warp ends are threaded.
- (iii) **The Harness** is the frame that holds the heddles in position. Each loom has two harnesses at least and may have twenty or more.
- (iv) **The shuttle** holds the filling or the weft yarn and is passed backwards and forwards across the loom.
- (v) **The Reed** is a frame which is located directly in front of the harness. This frame pushes forward each time the shuttle passes in between the warp yarns and presses back the filling in position.
- (vi) **The cloth beam** is located at the front of the loom and holds the completed fabric.

Q16. Name the three basic weaves. Explain any one of them.

Ans: The three basic weaves are Plain weaves, Twill weaves, Satin and Sateen weaves.

- (i) **Plain weave/ tabby weave:** It is the simplest and the most common of the three basic textiles weaves. It is made by passing its filling yarn over and under its row alternating, producing a high number of intersections. Plain weaves fabrics are not printed or given surface finished have no right or wrong side. They do not ravel easily but tend to wrinkle and have less absorbency than other weaves.
- (ii) **Twill weaves:** Twill is a type of weaves with a pattern of diagonal parallel ribs. It is one of three fundamental types of textile weaves along with plain weaves and satin. It is made by passing the weft thread over one or more warp threads then under two or more warp threads and so on, with a step or offset between rows to create the characteristics diagonal pattern. Because of this structure twill generally drapes well.
- (iii) **Satin weave:** It produces a solid one side of the cloth to give a smooth and lustrous surface. It is characterised by long floats on the surface. More warp yarns show on the surface. Originally satin fabrics are made from silk fibres.
- (iv) **Sateen weave:** More filling yarns show on the surface. Floats run on the cross side of the fabric. Sateen weave is used in a few mercerised cotton fabrics. The fabrics are not so lustrous or smooth as satin.



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Q17. Write the difference between Satin and Sateen weave.

Ans:

DIFFERENCES	
SATIN WEAVE	SATEEN WEAVE
1. It is warp faced fabric.	1. It is weft faced fabric.
2. Ends per inch is more than picks per inch in satin fabric.	2. Picks per inch is more than ends per inch in sateen fabric.
3. The weaving cost of satin is lower than sateen fabric.	3. The weaving cost of sateen is higher than satin fabric.
4. Satin is less durable compared to Sateen.	4. Sateen is much more durable, will last a longer than Satin.

Q18. Write in short: (i) Selvedges (ii) Harness (iii) Beating up/Battening (iv) Balance of cloth.

- (i) **Selvedges**- It is a “self-finished” edge of fabric, keeping it from unravelling and fraying. The term ‘self-finish’ means that the edge does not require additional finishing work, such as hem or bias tape to prevent fraying.
- (ii) **Harness**- The harness is the frame that holds the heddles in position. Each loom has two harnesses at least and may have twenty or more. Harness can be raised or lowered in order to produce the shed through which the filling thread is passed and thus control the pattern of the weave.
- (iii) **Beating up/ battening**- A warp yarn passes through the heddle eyelets and through opening in another frame that resembles a comb called reed. With each picking operation the reed automatically pushes or beats each filling yarn against the portion of the fabric that has already been formed. This essential weaving operation is therefore called beating up or battening. It gives the fabric a firm compact construction.
- (iv) **Balanced of cloth**: A fabric is made up of equal numbers and sizes of warp (filling yarns) weft per inch. A fabric of poor balance, when held in the light will show yarns running in one way i.e. length wise only. Such a fabric is not good as it does not stand hard wears and many washing.



Q19. Compare the service qualities of the three basic weaves by observing some handloom products.

Ans: The three basic weaves are plain weaves, twill weaves and satin weave. Plain weave is used in most fabrics. Its service qualities are:-

- a) It is a strong weave.
- b) It gives even texture to the fabrics.
- c) It gives same appearance on both front and back of the fabric.
- d) It is cheap and can be used daily.

Service quality of twill weaves in handloom products. It is used in weaving *Pashmina* and *Shatoosh* shawls.

Its qualities are:

- a) It gives strength to the fabrics.
- b) It gives interesting texture to the fabric.
- c) It gives thickness to the fabrics.

Satin weaves are used in brocades of *Varanasi* and *Tanchoi* fabric of Surat. Service qualities of satin weaves are:

- a) It has good draping quality.
- b) It is difficult to maintain.
- c) It is easy to snag.





EXTRA QUESTIONS & ANSWERS

Q1. What are the basic four steps of weaving operation? Name them.

Ans: The basic four steps of weaving operation are:

- a) Shedding
- b) Picking
- c) Beating up or battening
- d) Taking up or letting off.

Q2. Define "Count of the Cloth".

Ans: Count is the technical term used to indicate the number of warp and the weft in one square inch of fabric as it comes from the loom.

Q3. _____ weave is also known as homespun cotton or tabby weave.

- (A) Twill weave
- (B) Satin weave
- (C) Plain weave

Ans: (C) Plain weave

Q4. What are the variations of the twill weave? Name them.

Ans: The variations of the twill weave are:

- a) The herring bone twill weave.
- b) The broken twill weave &
- c) The zigzag twill weave

Q5. In the late _____ and early _____, scientist and inventors like Joseph Marie Jacquard and Edmund Cart Wright developed the weaving looms that were partially machine powered.

- (A) 1500 and 1600
- (B) 1600 and 1800
- (C) 1700 and 1800

Ans: (C) 1700 and 1800

Q6. Which fibres are known as protein fibre?

Ans:



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Q7. What are bulk yarns?

Ans: They are special textured yarns to contribute bulk to the fabrics. They have fluffy, bulky properties.

Q8. How is felting done?

Ans. Felting is the massing and flattening together of many fibres by beating and by applying pressure or steam to the fibres.

Q9. Differentiate between Rib and Basket weaves.

Ans:

DIFFERENCES	
RIB WEAVES	BASKET WEAVE
1. The filling yarns are larger/heavier yarns in diameter than the warp yarns.	1. Two or more yarns are used in both the warp and filling direction.
2. A rib weaves produces fabrics in which fewer yarns per square centimeter are visible on the surface.	2. These two or more groups of yarns are woven as one, producing a basket effect.
3. Examples: Window blinds in railway carriages and other vehicles, upholstering furniture, and cambric picket handkerchief.	3. Examples: Draperies, Tablecloths, Monk cloth, Oxford weave fabric, shirtings, dress materials, sailcloth, duck cloth, etc.

Or

RIB WEAVES: Heavier yarn may be used either in the warp or weft. This produces a ribbed effect lengthwise or crosswise. The lengthwise ribs in the direction of warp are formed by the filling yarns filling alternately over and under a group of warp yarns known as filling rib weave.

The crosswise ribs, in the direction of the filling are formed by the warp yarns passing alternately over and under a group of filling yarns known as warp rib weave.

BASKET WEAVE: It is a balanced weave. It is made up of two or more filling yarns passing over and under two or more warp yarns. The basket may be three by three or four by four or many other balanced arrangements. Very attractive fabrics may be produced by using coloured yarns. But this weave produces loose, less stable and often less durable cloth.
