IVC Course Code : 409

COMMERCIAL GARMENT TECHNOLOGY (CGT)

First Year

(w.e.f. 2018-19)

Intermediate Vocational Course

Paper I : Principles of Garment Making

Paper II : Textile Science

Paper III : Garment Construction

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Paper - I Priniciples of Garment Making

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ANNUAL SCHEME OF INSTRUCTION AND EXAMINATION FOR VOCATIONAL COURSES

1st YEAR COMMERCIAL GARMENT TECHNOLOGY COURSE

Part-A		Theory		Practicals		Total	
		Periods	**Marks**	**Periods**	**Marks**	**Periods**	**Marks**
1.	General Foundation course	150	50	-	-	150	50
2.	English	150	50	-	-	150	50
Part-B (VOCATIONAL SUBJECTS)							
3.	**Paper-1** Principles of Garment Making	135	50	135	50	270	100
4.	**Paper-II** Textiles Science	135	50	135	50	270	100
5.	**Paper-III** Garment Construction	135	50	135	50	270	100
	Total					**1110**	**400**

I

I. On The Job Training

Subject	Duration	Periods	Max. Marks	Total
OJT		363 (I year) + 450 (II year)	200	200
			Total	**200**

EVALUATION OF ON THE JOB TRAINING:

The "On the Job Training" shall carry 100 marks for each year and pass marks is 50. During on the job training the candidate shall put in a minimum of 90 % of attendance.

The evaluation shall be done in the last week of January.

Marks allotted for evaluation:

S.No	Name of the activity	Max. Marks allotted for each activity
1	Attendance and punctuality	30
2	Familiarity with technical terms	05
3	Familiarity with tools and material	05
4	Manual skills	05
5	Application of knowledge	10
6	Problem solving skills	10
7	Comprehension and observation	10
8	Human relations	05
9	Ability to communicate	10
10	Maintenance of dairy	10
	Total	100

NOTE: The On the Job Training mentioned is tentative. The spirit of On the Job training is to be maintained. The colleges are at liberty to conduct on the job training according to their local feasibility of institutions & industries. They may conduct the entire on the job training periods of I year and (450) II year either by conducting classes in morning session and send the students for OJT in afternoon session or two days in week or weekly or monthly or by any mode which is feasible for both the college and the institution. However, the total assigned periods for on the job training should be completed. The institutions are at liberty to conduct On the Job training during summer also, however there will not be any financial commitment to the department.

COMMERCIAL GARMENT TECHNOLOGY

Paper - I

PRINCIPLES OF GARMENT MAKING

INDEX

Unit 1

Terminology, Tools and Equipment and Basic Stitches

Structure

Learning Objectives

- To know the functions and uses of different tools.
- Identify the best tools used in construction of various parts of the garment.
- To understand the types of basic stitches.
- To know the various temporary stitches.
- To understand the types of permanent hand stitches suitable for stitching different fabrics.

Terminology

1. Fabric:

Fabric is cloth produced by weaving, knitting, lace making or other methods. The most common use of fabric is for clothes. All clothes are made of some type or combination of fabrics. They are available in different weights and texture. Fabrics are chosen depending upon the season, occasion, age and sex of the wearers.

Fig. 1.1 Fabric

2. Garment:

Garment is a piece or an article of clothing. It is a generic term that can be used when the specific kind of clothing. E.g.: Shirt, pant, blouse, frock

Fig. 1.2 Garment

3. Selvedge:

This is the finished edge of the fabric, keeping it from unraveling and fraying. Selvedge is densely woven is sturdier than the rest of the fabric. So, it can be more difficult to sew through. The selvedge can shrink during washing and drying leaving with puckered and distorted seams. In a good quality fabric, the selvedge is very compactly woven and is about 1/2 inch wide. In poor fabrics, selvedge will be narrow and loosely woven. (Fig. 1.3)

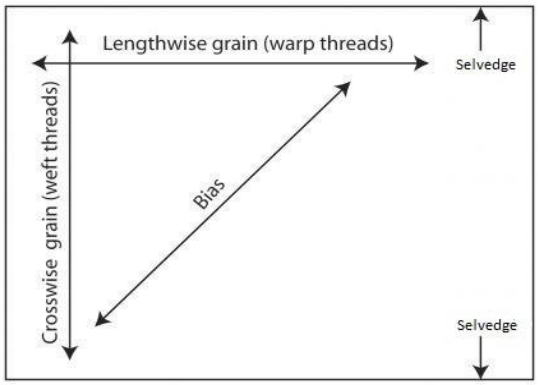


Fig. 1.3 Selvedge

4. Sloper:

This is a basic fitting pattern that fixes to the body closely, with very little ease. The sloper is then used to create basic pattern (blocks) from which infinite pattern designs can be created. Sloper is a type of basic pattern that is used as the building block for all other pattern making. Slopers are drafted based on specific body measurements and do not include seam allowance, wearing ease or any other design.

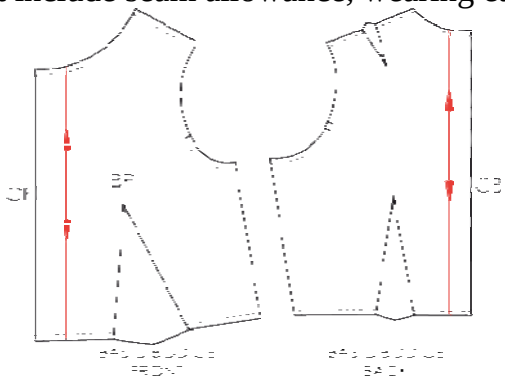


Fig. 1.4 Sloper

5. Bodice Block:

It is an article of clothing covering the body from neck to waist. It is the upper part of the dress, from shoulder to the waist distinguished it from the skirt and sleeves. (Fig. 1.5)

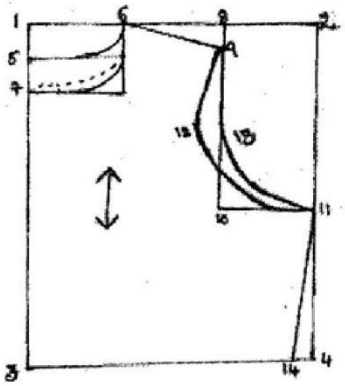


Fig.1.5 Bodice Block

6. Pattern:

The making of pattern is important for beginners as well as for experienced. It saves time and fabric, ensures better fitting and adds beauty to the finished garment. When patterns of the garments are required, they are either drawn from the measurements taken on the part of the body to be covered by a particular garment or modeled by shaping a length of material over the body. The patterns can be prepared using strong brown paper, newspaper for rough drafts. Tracing paper or butter paper is generally used in commercial patterns.

7. Commercial Pattern:

Commercial patters were first made in USA in 1850 by Ebenezer Bulterick who was a tailor. The first patterns were for boys and men's clothing. Patterns for women and children were developed later and became available commercially.

Commercial patterns are available in the market on standard measurements. They are usually done on tissue paper. Commercial patterns for women and children are usually sized according to standard measurements. Pants and shirts are sized according to waist and length measurements.

8. Grain:

In woven fabric the direction of the yarns indicates the Grain of the fabric. The three named grains are straight grain, cross grain and the bias grain. Woven fabrics are made up of lengthwise and crosswise or filling yarns interlaced at right angles to each other. These yarns are called lengthwise and crosswise grain of the fabric. On pattern, lengthwise grain is referred to as straight grain. Bias grain in any direction on a fabric does not exactly follow lengthwise or crosswise yarns. True bias makes an angle of 45 degrees with lengthwise and crosswise yarns. Lengthwise yarns are usually stronger and heavier and stretch less than crosswise yarns.

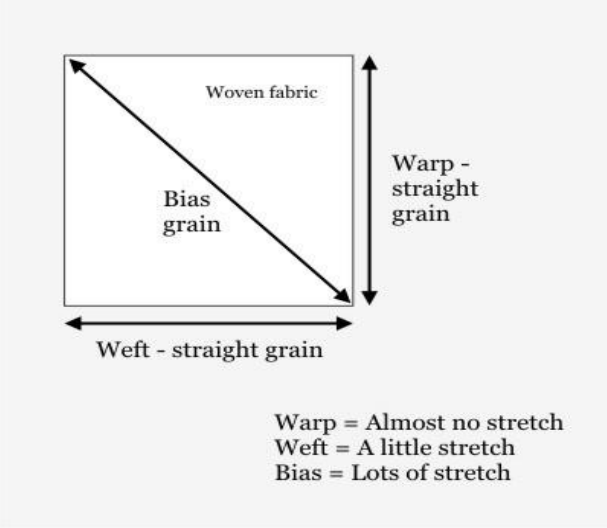
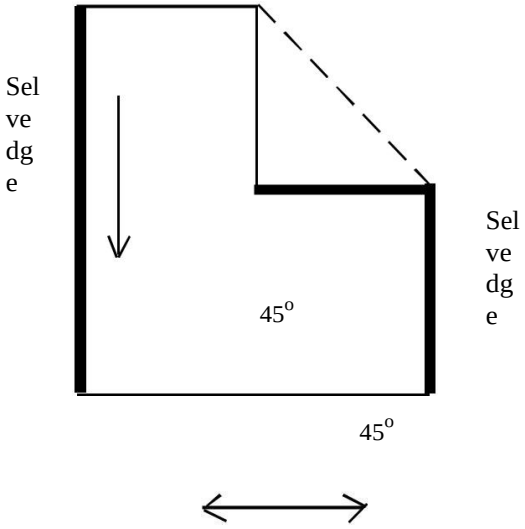


Fig. 1.6 Grain

9. Bias:

Bias is any direction on the woven fabric that does not follow exactly a lengthwise or crosswise yarn. True bias is formed by folding lengthwise yarns to meet crosswise yarns and is an angle of 45 degrees across the lengthwise and crosswise threads. It has greatest stretch. It is used in neckline facings or to finish any curved edges.



True Bias
Fig. 1.7 Bias

1.2 Tools and Equipment:

1.2.0 Introduction

Good tools and equipment help to sew easily and quickly. They are also essential for making garments of good quality and appearance. The equipment needed depends on the amount and type of sewing done. Each year new tools appear on the market. Often one will find an inexpensive item that can save hours of sewing time and helps to create more professional look.

Sewing kit first and foremost one should have a kit or basket with compartments for keeping the things one need for sewing. Arrange the contents in such a way that there is a place for everything.
The equipment or tools are categorized into:

1. Measuring Tools
2. Marking Tools
3. Cutting Tools
4. Pressing Tools

1.2.1 Measuring Tools:

1. Measuring Tape:

A flexible sewing tape is usually about 60 inches long and 5/8 inches wide. It is generally reversible with inches on one side and centimeters on the other to help take a more accurate measurement. The flexible material will not stretch and can easily be rolled up when not in use.

Because of its flexibility, it is a must-have tool for taking accurate body measurements. It can also be used to measure circles on the fabric by standing it up on its edge. (Fig. 1.8)

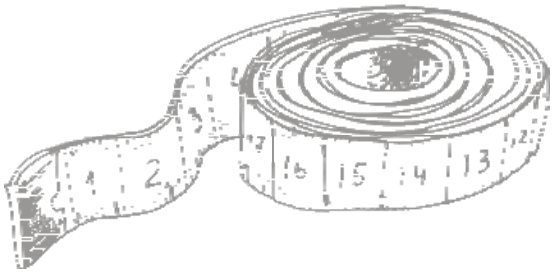


Fig. 1.8 Measuring Tape

2. Yard Stick or Meter Scale:

These may be wooden, plastic or metal. They are useful for checking grain lines when fixing pattern pieces on material and for drawing long seam lines on fabric or paper. (Fig. 1.9)

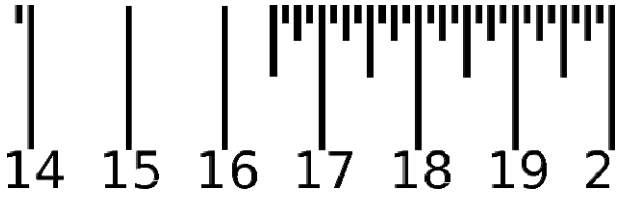


Fig. 1.9 Yard Stick or Meter Scale

3. L-Scale:

This has a perfect right angle corner and is used to draw lines at right angles at time of drafting. It has two arms or sides. One is usually 24-inch-long and another 12-inch long. It is helpful during the process of straightening the fabric to check whether the corners of the fabric have got the right-angled structure. (Fig. 1.10)

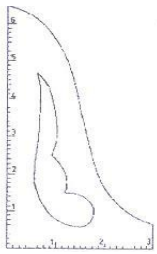


Fig. 1.10 L- Scale

4. Small Ruler:

There are two types of rulers, one is a small ruler of 1 inch wide and 6 inches long divided into 1/8" or 1/16" divisions on one side and centimeters on the other side, second one is of 2 inches wide and 1/18 inches long. A small transparent ruler 6 inch length divided into 1/8 inch or 1/16 inch division on one side and centimeters on the other side useful for measuring small distances. They may be wooden or plastic. Small rulers are used for measuring small distances for tucks; hem facings etc. (Fig. 1.11)

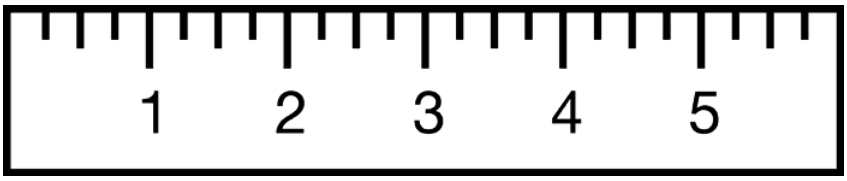


Fig. 1.11 Small Ruler

5. Hem Gauge:

A six-inch gauge can made of card board. It is used as a measuring guide for marking width of hems, pleats, seam allowances etc. Notches are provided at regular intervals along the gauge. One edge of the notch is at right angles to the straight edge of the gauge while the other edge is slanted. The straight edge of the notch is used as the guide.

6. Hem Marker:

It is the tool used to mark the length of hem every few inches. Hems can then be hand stitched or machine sewn, depending upon the preferences. (Fig. 1.12)

Fig. 1.12 Hem Marker

1.2.2 Marking Tools:

1. Dress Maker's Carbon:

This is a tracing paper available in different colours with one side waxed. It is used to transfer the pattern markings such as seam lines, darts, pleats etc., from paper pattern to the fabric being cut.

2. Tracing Wheel:

It is an instrument with multiple teeth on a wheel attached to a handle. The teeth can be either serrated or smooth. It used along with dress maker's carbon to transfer pattern markings on to cloth. Markings are transferred in the form of darts on the fabric surface. (Fig. 1.13)

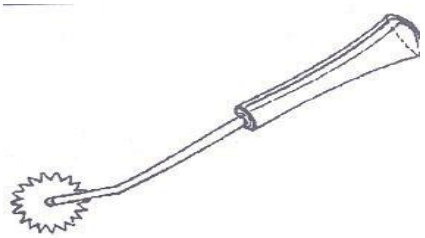


Fig. 1.13 Tracing Wheel

3. Tailor's Chalk:

It is hard chalk or soapstone used for marking pattern details on fabric. This is available in assorted colour and in rectangular or triangular shapes.

1.2.3 Cutting Tools:

1. Scissors:

These have round handles and the blades are usually less than 6 inches. They are designed mainly for snipping threads and trimming seams. However, scissors with 5 inches blade can be used by beginners for cutting fabric. For embroidery and for cutting button holes sharp pointed scissors with blades 1/2 inch to 1 inch long are very useful. The best types of scissors have blades of uneven width. They should be held so that the wider blades are above the narrower blade. (Fig. 1.14)

Fig. 1.14 Scissors

2. Dress Maker's Shears:

For cutting fabric shears are more satisfactory than scissors. Shears differ from scissors in that they have one small ring handle for the thumb and a large ring handle for the second, third and fourth fingers. They also have long blades. It is better to select bent-handles made of high quality steel and having blades joined with a bolt or screw rather than a rivet. (Fig. 1.15)

Fig. 1.15 Dress Maker's Shears

3. Pinking Shears:

Pinking Shears are scissors, the blades which are saw toothed instead of straight. They leave a zigzag pattern instead of straight edge. They produce a notched (zigzag) cutting line which prevents raveling of firmly woven fabrics. Pinking shears gives neat appearance to the inside of garments. (Fig. 1.16)

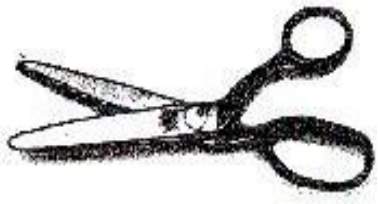


Fig. 1.16 Pinking Shears

4. Buttonhole Scissors:

These can be adjusted so as to cut buttonholes in any size. They are useful in tailoring and when need to make many buttonholes. (Fig. 1.17)

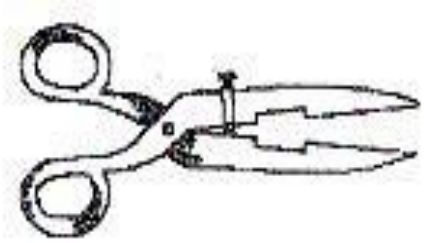


Fig. 1.17 Buttonhole Scissors

5. Electric Scissors:

Now-a-days Electric scissors is most popular instrument in clothing industry. It helps to cut huge fabric at a time. They are essentially battery-powered shears that cut without manually moving the blades. Electric scissors may also be known as power scissors or cordless_scissors. They mostly resemble a utility knife with dual crossing blades on the end rather than a single blade. Most varieties are powered by alkaline batteries, but a few are powered by rechargeable batteries. (Fig. 1.18)

Fig. 1.18 Electric Scissors

1.2.4 Pressing Tools:

1. Ironing Board:

This should be of convenient height and should be well padded. One may use an ordinary table covered with sheet and blanket for this purpose. They are most comfortable because the height can be adjusted (Fig. 1.19).

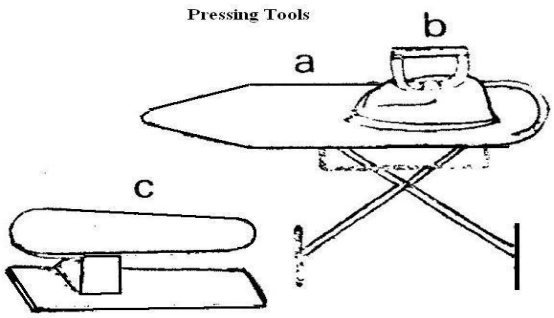


Fig. 1.19 Pressing Tools

2. Iron:

Keep an automatic iron handy for pressing fabric before cutting, during construction and after the garment is completed. A combination of steam and dry is best. One with a temperature control is essential.

3. Sleeve Board:

This is useful for ironing small parts like sleeves of a garment. It has a tapered end at one side and a round end on the other side. This also should be padded.

4. Press Cloth:

Fabric is used as press cloth should be colour fast and should be washed or boiled to remove all sizing.

1.3 Basic Stitches:

Basic Stitches are divided into constructive and decorative stitches. Constructive stitches are further divided into temporary and permanent stitches.

1.3.1Temporary Stitches:

Tacking or basting is a temporary stitch used for folding two or more layers of material together before the permanent stitches are made. Usually, this stitch is horizontal and is worked from right to left. This is the only stitch which is started with a knot. For tacking, use a contrasting colour thread so that it can be easily sewn and removed. The length of stitches will vary depending on the thickness, weight of the fabric.

1. Even Tacking:

In this, stitches are of equal length about 1/4 inches on both sides of the material. It is short temporary stitch used on smooth fabric and in areas that require close control such as curved seams. (Fig. 1.20)

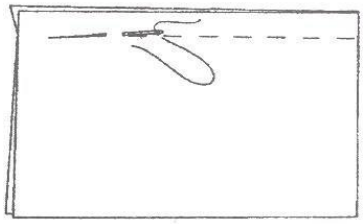


Fig. 1.20 Even Tacking

2. Uneven Tacking:

In this the length of the stitch on the upper side is at least twice on the underside. This type of basting is used as a guideline or where there is little or no strain. It is usually made on single layer of fabric. The size of the stitch on the upper side is usually 1/2 inch. This is called galloping stitch or uneven tacking. (Fig. 1.21)

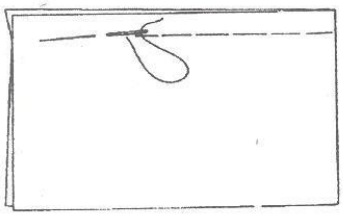


Fig. 1.21 Uneven Tacking

3. Diagonal Tacking:

This stitch is used when several layers of fabric are to be held securely. Work, stitches through the material at right angles to the fabric edges so that a diagonal or slanting stitch is made on the upper side and a small vertical stitch on the underside. The stitches are made about 1/4 inch to 1 inch. Contrasting colour thread is used for this stitch worked from right to left. This stitch is especially used for lining and inter-lining. (Fig. 1.22)

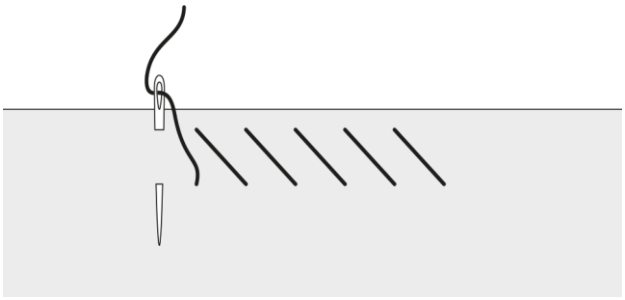


Fig. 1.22 Diagonal Tacking

4. Slip Tacking:

This is most often used when matching seams in checked and striped fabric. This is also used to seam lines that have been fitted from the right side of the garments. Usually the length of the stitch is 1/2 inch to 1/4 inch. (Fig. 1.23)

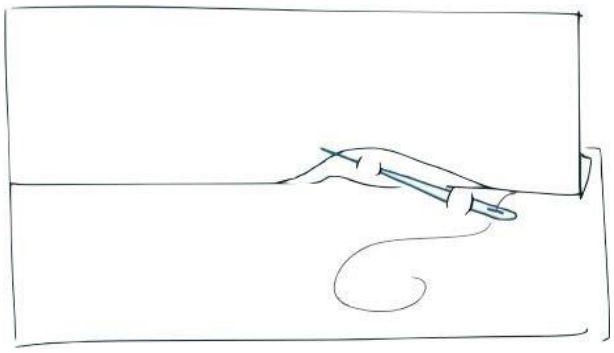
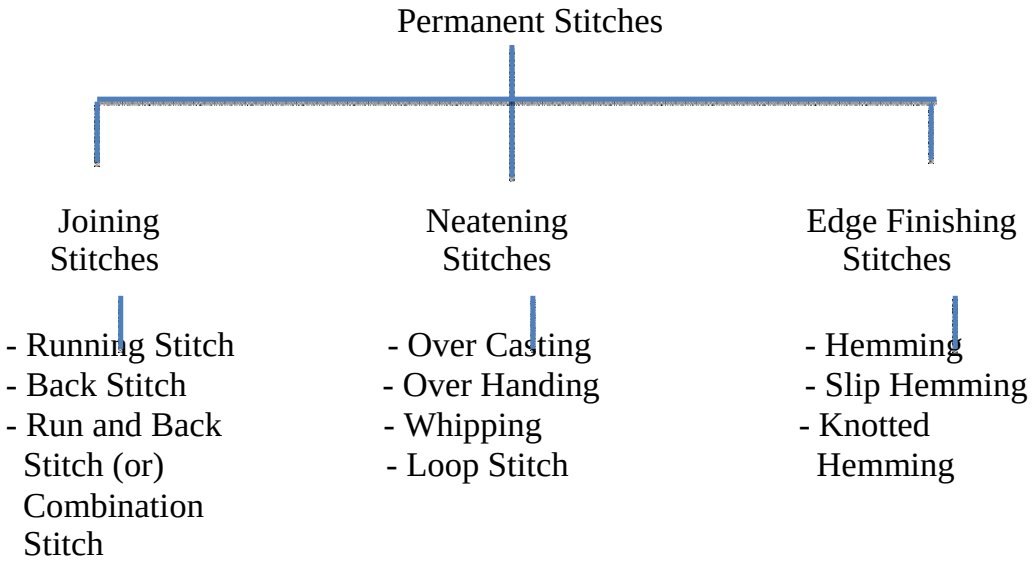


Fig. 1.23 Slip Tacking

5. Machine Tacking:

This is the most convenient method, set the machine for the longest stitch then hold the pieces of material together and machine. If there is any doubt about any edge stitching e.g. the neck edge or the arm hole edge, it is better to machine the single material first. This will prevent sloping the material.

1.3.2. Permanent Stitches:



Joining Stitches:

1. Running Stitch:

This is the simplest form of hand stitch which is used for permanent sewing. Basically, this stitch is very similar to tacking. The stitch and space are equal but it is very much smaller than tacking. The stitches should be straight, fine and evenly spaced about 1/16 to 1/8-inch length. Pass the needle through the fabric several times before pulling it. Handmade seams, tucks, gathering, shirring, quilting and mending can be done with this stitch. (Fig.1.24)

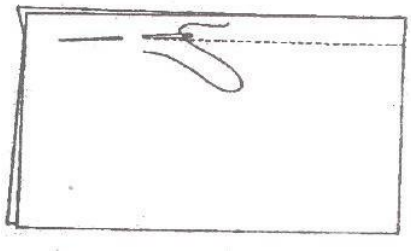


Fig. 1.24 Running Stitch

2. Back stitch:

The back Stitch is strong and sometimes substituted for machine stitching. Stitches should be 1/16 to 1/8-inch-long on the top side. To make the back stitch, push needle up through the material at a point on the stitching line about 1/8. Take a stitch inserting the needle 1/8 inch back of the thread at the beginning of the stitching line and bringing it out at equal distance in front of the thread. Repeat this way keeping stitches uniform in size and fairly firm. (Fig.1.25)

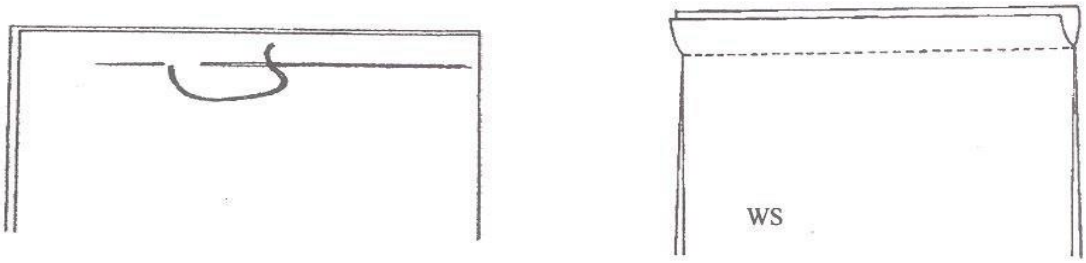


Fig. 1.25 Back Stitch

3. Run and Back Stitch or Combination Stitch:

This is the finest of the plain stitches and is a combination of running and back stitch. This stitch is used for working plain seams done by hand. This stitch is faster than the back stitch and stronger than the running stitch. It is excellent for neatening in any prominent position. (Fig.1.26)

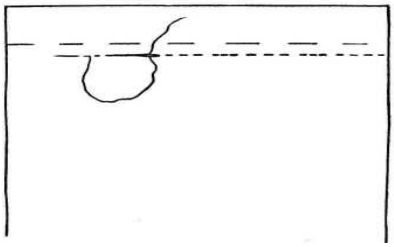


Fig. 1.26 Run and Back Stitch or Combination Stitch

Neatening Stitches:

1. Over casting:

This is a slanting stitch used on raw edges either single or double to prevent them raveling. Keep the size and spacing of stitches uniform. This stitch is slanting on both sides. (Fig1.27)

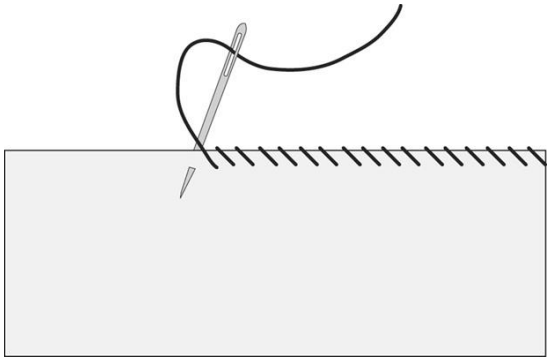


Fig. 1.27 over Casting

2. Over handing:

This stitch is used to secure to finished or folded edges together for applying lace or patch or insertion. Fold and press back the two seam allowances wrong side and place the fabric right side facing with a seam lines matching. Insert needle through the back fold and then through the front fold picking up one or two threads each time. Bring the needle out diagonally to the left. This produces a straight stitch. The stitches should be close together. (Fig 1.28)

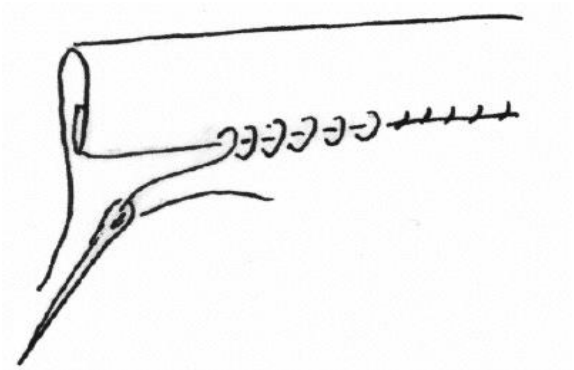


Fig. 1.28 over handing

3. Whipping:

This stitch is similar to overhand stitch and serve the same purpose. Sometimes it is used to finish edges of hand kerchiefs. The only difference between over handing and whipping is that the later produces slanting stitches. It is a light finish for short seams in fine materials. (Fig. 1.29)

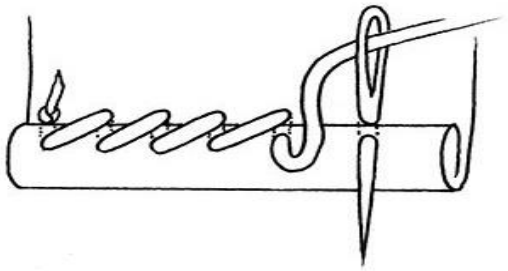


Fig. 1.29 Whipping

4. Loop Stitch or Blanket Stitch:

Loop stitch is made along the thread to go under the needle when a stitch throws the material. The work can be held with the edge upwards for convenience. Loop stitch is also used as decorative stitch to finish the edges of table cloths, mats. (Fig. 1.30)

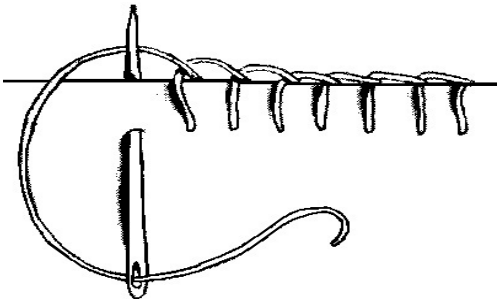


Fig. 1.30 Loop Stitch or Blanket stitch

Edge finishing Stitches:

1. Hemming:

This stitch is used to fasten a raw edge which must be turned in. It is always worked from the wrong side of the fabric. The stitches must be as clear as defined the right side as on the wrong side from which they are being worked. It's most common use is for hems. The stitch on the top together with the stitch on the underside should form like the letter "V". (Fig 1.31)

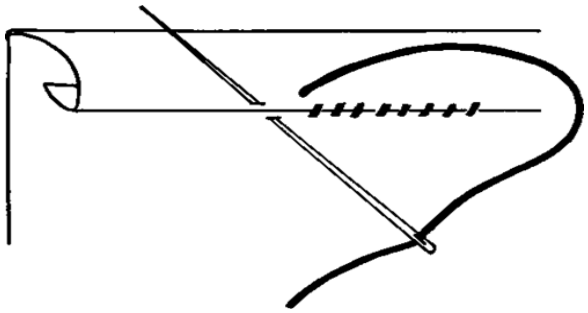


Fig. 1.31 Hemming

2. Slip Hemming:

This is used for the hems, facings or folds where invisibility is more important than strength. Fasten the thread beneath the hem, bringing the needle out through the edge of the fold. Take tiny stitch in the garment directly beneath the point when the thread leaves the fold. Now insert the needle in the hem, slip it along inside the fold and bring it out about 1/2 inch away. Repeat the stitch. (Fig. 1.32)

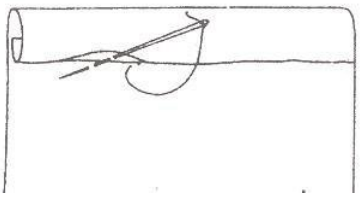


Fig. 1.32 Slip Hemming

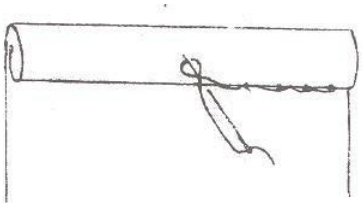


Fig. 1.33 Knotted Hemming

3. Knotted Hemming:

This is worked from right to left. A small vertical hem stitch is made such that the thread passes around the tip of the needle that on pulling the needle forms a knot around the stitch made. Thus, each stitch is fixed securely by means of a knot and therefore is very strong. (Fig. 1.33)

Summary

Sewing equipments are essential for making garments of good quality and appearance. A variety of tools and equipment are used for performing various functions such as measuring, marking, cutting, pressing. Each category of tools has their own purpose in garment construction and finishing.

Basic stitches are classified into constructive and decorative stitches. Constructive stitches are further classified as temporary and permanent stitches. They are inconspicuous, continuous, strong and flat. Decorative stitches help in enhancing the beauty of the garment.

Key Words

Bias: The diagonal line of fabric that is one neither the lengthwise nor the cross wise grain.
Raveling: Yarns pulled away from the fabric.
Sewing kit: A box containing necessary tools for sewing.

Short Answer Type Questions

1. What is selvedge?
2. What is sloper?
3. Write about commercial pattern.
4. What is Bias?
5. List out cutting tools used in garment making.
6. Write about tracing wheel.
7. Name the measuring tools used in garment making.
8. Name four types of tacking.
9. What are the different types of permanent stitches?
10. What is whipping?

Long Answer Type Questions

1. Describe the various measuring tools used.
2. Write about pressing tools and their uses.
3. Explain the cutting tools used in garment construction.
4. What are the different types of joining stitches?
5. Explain about neatening stitches.
6. Write about edge finishing stitches.

On Job Training

Identify the best tools used in construction of various parts of a Garment.

Unit 2

SEWING MACHINES

Structure

Learning Objectives

- Identifying the types of sewing machines
- To have knowledge about parts of the sewing machine
- To understand the mechanism of sewing machine
- To understand the troubles caused and their remedies
- To know the importance of oiling and the maintaince of the machine

2.0 Introduction

A sewing machine is a machine used to stitch fabric and other materials together with thread. There are a huge range of sewing machines and every machine has its own different features. Different types of machines used to sew different types of clothes. There are many types of machines that can be used in every type of sewing and these machines can be helpful for those persons who want to sew different things. Home sewing machines are designed for one person to sew individual items while sewing a single stitch type. In modern sewing machine, the fabric easily glides in and out of the machine and can perform multiple tasks

Types

Sewing machines are now available in various models such as domestic model, tailor model, industrial model, portable and cabinet models. They may be operated by hand, treadle or electric motor.

Hand - Operated Sewing Machine

This is the simplest form of sewing machine easy to carry and which is operated by hand. A detachable handle provided to the fly wheel is used to operate the machine. This machine is generally suitable for domestic purpose because it does not help in speeding up the work.

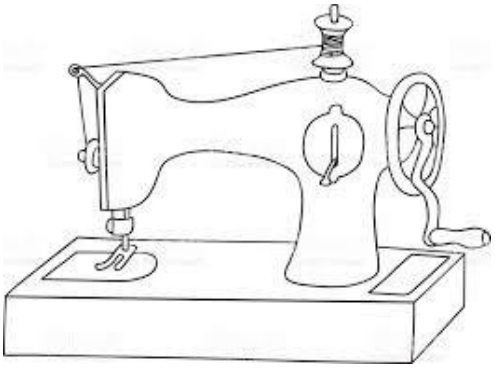


Fig. 2.1 Hand Operated sewing machine

Treadle Sewing Machine

This machine is exactly like hand sewing machine but it is operated by foot. This machine is operated faster than that of the hand-operated machine. This machine is suitable where there is no power supply. When handling this machine both the hands are free to handle the fabric, speeding up the work. Even some of the heavy-duty machines are operated by this method.

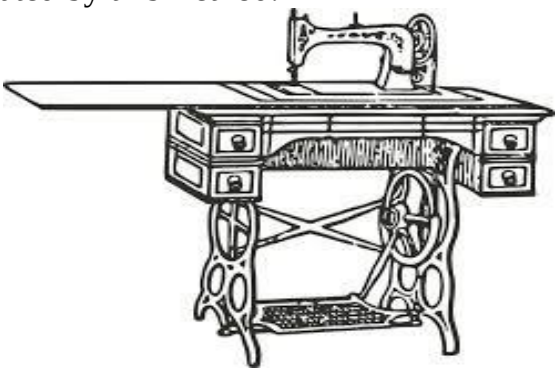


Fig. 2.2 Treadle sewing machine

Electric Sewing Machine

This is the fastest sewing machine. One needs practice to handle it. In an electric machine the balance wheel comes to motion by a belt, which is attached to an electric motor. The three types of electric sewing machines available are straight stitching, straight stitching with semi-automatic and automatic stitching machines.

Fig. 2.3 Electric sewing machine

2.2 Parts and Functions of the Sewing Machine

The basic structure of sewing machine is the same whether it is hand sewing machine, treadle sewing machine or electric sewing machine. The basic parts of a sewing machine are listed below as seen in Fig. 2.4

1. **Spool Pin**: - It is fitted on the top of the arm to hold the thread reel.
2. **Thread Guide**: - It is a small hole made of spring wire through which thread runs directly to needle.
3. **Thread Tension Device**: - It is a mechanism fixed to the face plate for controlling the quality of the stitches. It is a simple mechanism where two concave discs are put together facing the convex ends of each other. The thread is made to pass between the two. The tension of the thread is adjusted by a spring and a nut which increases or decreases the pressure on the discs.
4. **Take up Lever**: - It is a lever fitted to the body of the arm which receives its up and down motion from the front. At the outside end of the lever there is a small hole through which the thread passes. There are two functions of this lever: -
   (a) To feed the thread to the needle,
   (b) To tighten the loop formed by the shuttle.
5. **Needle Bar**: - It is a highly polished rod made of special steel which holds the needle at one end with the help of a clamp. Its main function is to give the needle its motion.
6. **Bobbin Case**: - It is a device which helps to fill up the bobbin evenly. Thread passes through it tightly or loosely as desired by the operator
7. **Pressure foot**: - It is a shoe shaped component fixed to the bar to hold the cloth while sewing.
8. **Pressure Foot Lifter**: - It is a lever attached to the pressure bar to control the up and down movement of the pressure foot.
9. **Stitch regulating Scale and Screw**: - The length of the stitches should be adjusted, according to the type of the cloth. This is done with the help of the regulating screw. The length of the stitches is determined by the graduation marks.
10. **Bobbin winder**: - It is a simple mechanism for winding thread on the bobbin.
11. **Fly wheel**: - It is a heavy metal wheel fitted to the crank shaft with a bush. When it is made to revolve, it works the mechanism of the machine. It is always driven towards the operator.
12. **Clutch or Thumb Screw**: - This is in the centre of the fly wheel and it engages and disengages stitching mechanism by loosening or tightening it.
13. **Slide Plate**: - It is rectangular plate also with highly polished surface and is placed in such a position as to facilitate the removal of the bobbin case for rewinding the bobbin without lifting the whole machine.
14. **Needle Plate**: - It is a semi-circular disc with highly polished surface and a hole to allow the needle to pass through it. It has slots through which the feed dog works. Fundamental purpose of this plate is to provide a leveled surface

for the cloth and to prevent the dust entering the inner mechanism of the sewing machine.

15. **Feed Dog**: - This consists of set of teeth that is fitted below the needle plate and it helps to move the cloth forward while sewing.
16. **Face Plate**: - A cover which on removal gives access to the oiling points on the needle bar, pressure bar and take up liver
17. **Spool pin for bobbin winding**: - Spool of thread is placed on this at the time of bobbin winding. It is located on the base of the machine.
18. **Treadle**: - It is at the base of the machine when this is pressed with legs, the drive wheel revolves making in turn, the machine to work.
19. **Pitman Rod**: - It connects the treadle and drive wheel. As the treadle is operated the drive wheel revolves.

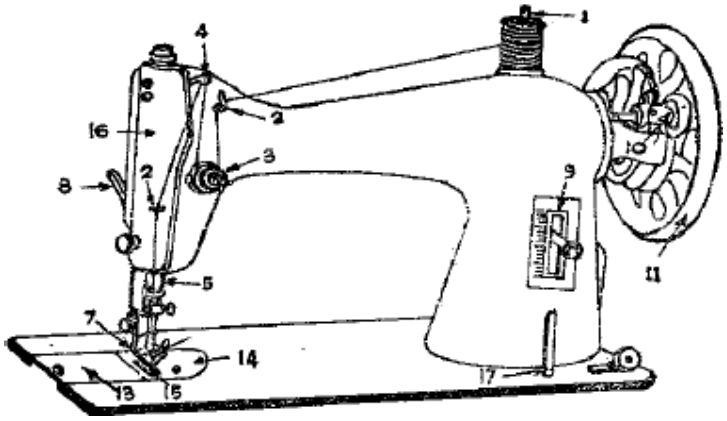


Fig. 2.4 Parts of the sewing machine

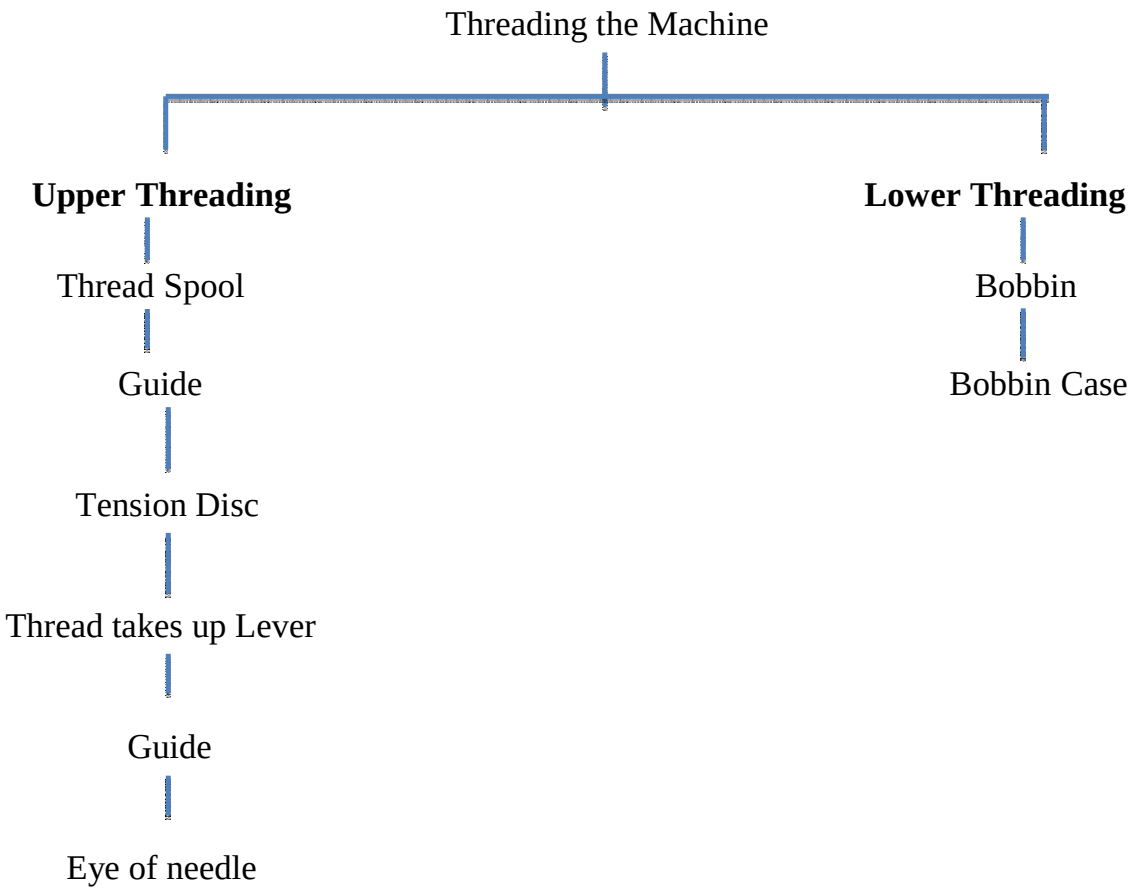
2.3 Operating the Machine:

Manufacturers supply instruction manuals with each sewing machine, they sell. It is essential to read this book carefully and follow the instructions meticulously, when you are learning to treadle run the machine with the pressure foot up and the clutch on flywheel loosened, so that the needle does not move up and down. Sit at a comfortable height in front of the machine and place one foot forward and the other foot slightly backwards on the treadle. Start, the machine by turning the fly wheel towards you. As the treadle begins to move, start pedaling slowly, such a way as to continue this motion. Continue evenly, and gradually increase the speed. To stop the machine, place your hand on the fly wheel and stop the motion of the feet. Practice to run the machine smoothly at the low and high speeds.

If one has a hand machine, one need to practice to run the wheel smoothly with one's right hand and guide the fabric with the left hand.

An electric sewing machine is operated by knee or foot to control an electric motor. A little practice is required to control the pressure needed to operate the machine at any desired speed with an even and regular rhythm.

Threading the Machine:



If one traces the thread from the spool to the needle, one will find the threading the needle is an easy process. It is begun by raising the presser foot with the presser bar lifter and moving the balance wheel until the take up lever is at the highest point. Keeping the right hand on the spool, allow it to run only as needed, while the left hand carries the thread to the point through which it should pass. Pass the thread through the eye of the needle from the side on which the last thread guide is located, leaving about 10 cm of thread extending beyond the needle hole.

Stitching along lines:

Tighten the clutch or thumb screw and without threading the machine, lower the presser foot and practice stitching on paper along lines of various shapes-straight lines, curved lines, broken lines and line with corners – until one can control the machine reasonably well. To turn corners, stop with the needle down at the exact corner, raise the presser foot, turn the paper to the desired position, lower the pressure foot and continue stitching.

Winding the Bobbin:

The bobbin must be wound evenly for smooth stitching. Great care should be taken in winding the bobbin to have the thread placed on the bobbin smoothly and evenly. The bobbin should never be wound fully, that it is tight in the bobbin case or shuttle. A correctly wound bobbin will ensure a smooth running of the thread from the bobbin case and it will prevent an uneven stitch that might occur if the thread is placed on the bobbin unevenly. To wind bobbin, first release the stitching mechanism, by loosening the stop-motion screw, then place the empty bobbin on the winder and press it down. Insert thread on to the bobbin and holding thread in the left hand, run the machine for sewing. Keep the speed steady to ensure even winding.

Under or Bobbin Thread:

When inserting the bobbin hold it, so that the thread winding is counter clockwise if the thread on the case runs clockwise and vice versa. The bobbin thread when drawn into the slot must be under the tension spring. It cannot spill out when the machine is in use. Unless this thread passes under the tension springs, loops of thread form in stitching.

To set the needle correctly:

1. Turn the balance wheel until the needle bar is at the highest point.
2. Loosen the thumb screw and remove old needle.
3. Place the new needle in clamp making sure that the flat side of the needle shank faces. The right groove of needle bar can go as far into the groove under the clamp as it can go and tighten the thumb screw.

Testing the needle for straightness:

Care should be taken to see that the needle is perfectly straight. This can be determined by placing the flat side of the needle on the side plate of the machine or any other flat solid surface. A straight needle will show an even amount of light under it and the point of a crooked needle will be closer or further away from the plate.

2.4 Machine Troubles - Causes and remedies

1. Skipped Stitches:

Causes:

a. Failure of hook or looper and needle to enter loop at correct time.
b. Irregular thread tension on upper or lower loop
c. Due to needle deflection.
d. If needle thread loop size is too small.
e. When flagging of fabrics is happened during sewing.
f. If sewing thread is unable to form loop.

Remedies:

a. Examine the setting and timing between needle and hook or looper.
b. The tension of thread should be adjusted.
c. Needle should be changed.
d. Needle size and thread should be adjusted.
e. The pressure of pressure foot should be adjusted properly.
f. Thread should be changed.

2. Unbalanced Stitch:

Causes:

a. Incorrect tension of sewing thread.
b. Used incorrect thread path.
c. Incorrect adjustment of needle thread path.
d. Snagging of needle with bobbin case and positioning finger.
e. If sewing threads are not lubricated.

Remedies:

a. Setting of accurate tension to the thread.
b. Using of accurate thread path.
c. Using of right thread path.
d. Bobbin case to be smooth and finger positioning to be set again.
e. Better quality threads must be used.

3. Staggered Stitch:

Causes:

a. Due to needle deflection.
b. Due to wrong needle point.
c. Incorrect adjustment of needle and thread size.
d. Due to defected motion of feed dog.
e. If fabrics are not controlled properly in the feed mechanism.

Remedies:

a. Needle size should be increased.
b. Needle should be changed.
c. Needle size and thread size should be changed.
d. Feed dog motion should be adjusted.
e. Accurate pressure of pressure foot should be adjusted.

4. Variable Stitch Density:

Causes:

a. Incorrect unwinding of thread from package during sewing.
b. Twisting of needle thread in the bottom of the thread package.
c. Twisting of thread guide.
d. Excessive tension of thread.
e. Using of broken check spring.
f. Fraying of thread in the needle.
g. Sewing thread getting heated.
h. Becoming more heated of hook.
i. Using of low quality sewing thread.

Remedies:

a. The position of thread guide should be 2.5 times higher than the position of the thread package.
b. Foam pad should be use to the bottom of the thread package.
c. Correct threading of sewing thread during sewing.
d. Tension of thread should be less or use of higher strength threads.
e. Check spring needs to be changed.
f. Finer threads or heavy needle should be used.
g. Needle lubricant and needle cooler should be used.
h. Lubricant should be available and test the distance between needle and hook.
i. Sewing thread should be changed.

5. Seam Puckering:

Causes:

a. Thread tension high.
b. Improper thread balance.
c. Incorrect thread types.

Remedies:

a. Bobbin tension should be kept as low as possible.
b. Proper thread balance should be ensured between top and bottom thread.
c. Have to maintain tension guides properly.

6. Bobbin or looper threads breakage:
Causes:

a. Incorrect winding of threads on to the bobbin.
b. Excessive tension to the bobbin threads.
c. If the edges of bobbin case, lopper eye are more sharper than usual.
d. Incorrect fitting of bobbin case.

Remedies:

a. Proper winding of threads on to the bobbin.
b. The tension should be adjusted to the bobbin threads.
c. The edges should be smooth.
d. Test the size and type of bobbin.

7. Needle Thread breakage:

Causes:

a. Incorrect winding of threads on to the bobbin.
b. Excessive tension to the bobbin threads.
c. If the edges of bobbin case, lopper eye and so on are sharper.
d. Incorrect fitting of bobbin case.

Remedies:

a. Proper winding of threads on to the bobbin.
b. The tension should be adjusted to the bobbin threads.
c. The edges should be smooth.
d. Test the size and types of bobbin.

8. Thread sewing when sewing machine stops:

Causes:

a. Faulty sewing thread.
b. Densely woven fabric which is poorly finished.
c. Damaged needle.

Remedies:

a. better quality thread Should be used.
b. Fabric finishing should be improved.
c. The needle should be changed.

Care of the Machine:

In order to operate the machine smoothly, it is necessary to oil and clean it regularly. Oiling and care of the machine ensure satisfactory sewing and a long life for the machine. When not in use, keep the machine covered to prevent dust from settling on it.

Cleaning:

One should always remove lint deposits, dust and thread bits before oiling any part of the machine. Use a pointed instrument like a needle to pick out bits of thread and lint that cannot be brushed out. To clean the feed dog, remove the needle plate of the machine and brush off all lint deposits and dirt sticking to the mechanisms. To clean the shuttle race, remove the two screws holding the shuttle race, take out of the shuttle race and wipe its groove free of dirt, fluff and broken bits of thread. Sometimes, loose threads would around the pivots of the treadle make the machine hard to run. One must remove the thread bits which are caught in the wheel and all lint and dust sticking to the treadle parts.

Oiling:

It is necessary to oil and lubricate the machine periodically. If the machine is used every day, oil it once a week. After oiling, wipe off the surplus oil and place a piece of folded fabric under the pressure foot to absorb any excess oil. To oil thoroughly, remove the upper thread, needle plate, slide plate, faceplate, bobbin case, and needle and presser foot. Oil the holes on the underside first, after cleaning and then proceed to the upper side. Use only few drops of oil in each hole. Never use coconut oil. Machine oil of different brands may be used for different models of sewing machine but should be used as recommended in the instruction book.

If the machine becomes gummed with oil, put a drop of kerosene or petrol in each oil hole and joints and run the machine rapidly for several minutes. Wipe off and reoil it with machine oil. The motor of electric sewing machine should be greased periodically. (Fig. 2.5)

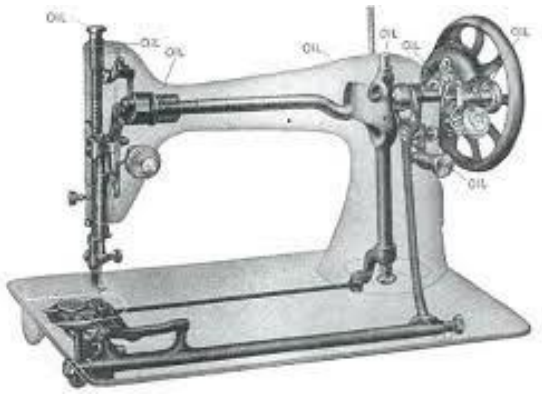


Fig. 2.5 Oiling of sewing machine

Key Words

Lever: It is a handle or bar that is attached to the machine and which is lifted or pushed in order to operate the machine.

Fray: Threads or fibers coming apart from cloth which spoil its appearance.

Lint: Very short fibers of cotton or other material.

Scrap: It is a very small piece of waste.

Summary

Sewing machine is essential for making garments. Well selected machine along with proper care ensures quality stitching. The various parts of a sewing machine and their functions help one, to understand the working of a sewing machine. Knowledge of common machine problems helps us to understand and rectify the problems. Above all, care of sewing machine is rather important for a long service of the machine.

Short Answer Type Questions

1. List out the types of sewing machines.
2. How does the take up lever work?
3. Write about feed dog.
4. List the common machine problems that occur.
5. Write about stitch regulator.
6. What is the function of tension disc?

Long Answer Type Questions

1. Explain the types of sewing machine.
2. Explain Oiling and Cleaning methods of the sewing machine.
3. What are the common machine troubles and their causes?
4. Write in detail about the parts and functions of sewing machine.

On Job Training

1. Visit nearby tailoring shop and check the types of Sewing Machines.
2. Collect pictures of different sewing machines used in clothing construction.

Unit 3

Pattern making

Structure

Learning Objectives

- To understand the different methods of making patterns.
- To gain knowledge of Pattern Making Techniques.
- Points to be considered while preparing paper patterns.
- Types of Paper Patterns.

3.0 Introduction

A basic pattern of a garment can be prepared by one of these two methods i.e. by drafting or by draping. Drafting is the system of drawing patterns on paper with mechanical precision using body measurement. This is an effective and economical method which can be learned easily unlike draping which requires a model, lot of fabric and considerable skill. The basic pattern which is developed on paper may be modified to develop patterns for varied styles. This is also called as flat pattern designing. The basic pattern is also referred as sloper, block and master or foundation pattern.

The paper patterns can be prepared using strong brown papers, newspapers for rough drafts, strong white paper which is available in a variety of weights and widths, tracing paper or butter paper may be used to develop patterns

3.1 Draping

Draping is an important part of fashion design. Draping for fashion design is the process of positioning and pinning fabric on dress form to develop the structure of the garment design. It requires a model, lot of fabric and considerable skill. Draping is generally carried out in materials such as muslin. Original dress designers with an artistic trend prefer this technique and are used by leading dress designers.

Merits

- Various styles can be tried over the model.
- Very simple to work when the techniques are learnt.

Demerits

- Require skill to drape.
- It requires a model.
- It requires lot of fabric.
- Laborious process.
- Not economical as fabric consumption is more.
- It is time consuming.

Drafting

Drafting is the system of drawing patterns on paper with mechanical precision using body measurements. This method is very useful for beginners, as well as it help in acquiring proficiency in dress designing. It eliminates the risk of material being wasted due to errors in cutting.

Drafting should be done on brown paper. To obtain accurate draft, use sharp pencil, a ruler for drawing straight lines – to get corners at right angles, keep one L-scale or set-squares.

The Primary basic patterns – plain bodice, plain sleeve and plain skirt without seam allowance. (While laying pattern on fabric before cutting seam allowance should be included).

Merits

- It is an inexpensive method.
- Pattern that can be developed that suits each individual is possible.

Demerits

- It is time consuming process and it takes lot of time to draft the pattern.
- Unless the technical principal of drafting known, it is difficult for the persons to prepare pattern.
- The paper pattern is used more than once unless copied on thick sheet.

3.3 Flat pattern

The basic pattern is developed on paper, to be modified to develop patterns for various styles. This method is called Flat Pattern designing. In this technique the style is created from basic bodice block. This basic block is the foundation pattern and provides the basis, from which patterns of varied styles can be developed.

Merits

- It provides the versatility to create designs according to fashion changes. This method requires a basic pattern fitted to the dummy or the individual figure.
- Basic slopers or basic blocks which can be adapted for particular designs.
- Pattern alterations are very easy. Pattern can be altered by creating and shifting darts to new places, by adding pleats, gathers, yokes. This alteration is very simple in flat pattern technique.
- The main one important advantage of this technique is that the newly developed designer pattern retains the size of original basic pattern.
- Grading in different sizes can be done very easily by flat pattern techniques. It saves time and energy, otherwise wasted in making pattern for different sizes.
- It is very useful for mass production of garments as it is based on standard measurements.
- One basic pattern or sloper can be used again and again to develop several designs.
- All paper patterns have seam allowances and detailed markings. It makes it, easy to work.
- It provides better understanding and use of commercial patterns.
- A woman with figure irregularities can save hours of alteration, basting and fitting an individual garment by making her own pattern from a basic pattern, fitted to her figure.
- A creative person whose interests and talents lie in the costume designing can design her own wardrobe by creative use of flat pattern design. One can restyle old and out dated pattern.

Demerits

- It requires good skill in manipulating the basic pattern.

3.4 Contents of paper pattern

Good patterns are carefully labeled with the following information.

- Name of the block. E.g. bodice front, back, sleeve, skirt, collar, yoke, pocket etc.
- Grain line on each pattern piece.
- Pattern size like 32”, 34”, 36”, 38” etc.
- Centre front or centre back indication.
- Style number or code number of the pattern.
- Number of pieces to cut from each pattern piece.
- Pattern markings like notches, buttons and buttonhole position, seam allowances, grain lines, centre front, centre back, hem line markings.
- Cutting information – Number of pieces to cut, E.g. cut 1, cut 2, cut on fold.

- Whether seam allowances are included or not.
- Method of construction.
- Fabric suitability.

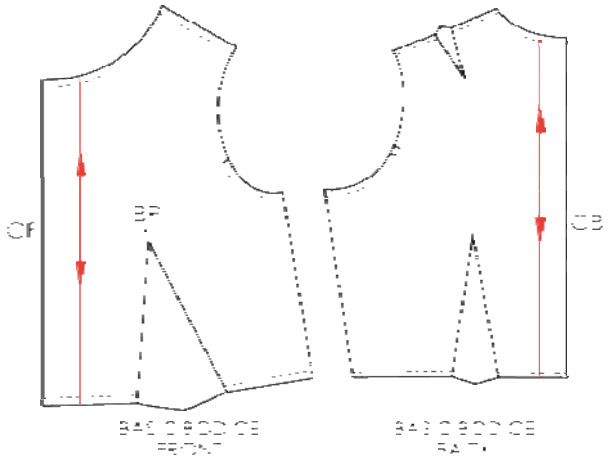


Fig. 3.1 Contents of Paper Pattern

Uses of paper patterns

- Paper patterns for various styles can be prepared and stored easily. The basic pattern can be prepared, which later can be used to develop other styles.
- Number of styles can be developed in a short time and can be used effectively even if the person using paper patterns do not have any idea of drafting patterns.
- By manipulating the basic pattern pieces, it is possible to produce pattern for the complicated and original designs.
- A paper pattern of a particular size can be used to make new patterns of proportionately larger or smaller sizes by following a systematic procedure called Grading.

3.6 Commercial pattern

Reputed companies standardize their patterns after doing a lot of research and trying out the fit on models. If the measurements have the same proportions as for the standard size figure it should be simple to buy a commercial pattern than to draft. So, the commercial pattern saves time and effort. It may even give a better fit than a home pattern done by an inexperienced person.

Merits

- They are helpful for the inexperienced persons in tailoring.
- They save lot of time and human effort.
- If one has similar standard measurement, it is easy to fit the garment.
- It may even give a better fit than a homemade pattern, some times.

Demerits

- Commercial patterns are expensive.
- Secondly patterns for different types of garments are not readily available in India, and good patterns are especially hard to get.
- Commercial patterns do not give good fit without some alterations in pattern process.
- Alteration processes are rather complicated and may prove more laborious in practice than drafting patterns.

Uses of commercial pattern

- Readily available in the market.
- As they are prepared by reputed companies after a lot of research, they fit well.
- If one has similar standard measurements, it easy to make a fitting garment,
- They save lot of time and human effort.
- More suitable for inexperienced persons in pattern preparation to construct a garment.

Summary

Pattern making has its own importance. Each word has its own special meaning, which gives a correct picture about the fabric and cutting. Pattern making gives knowledge of preparing paper patterns using different people's body measurements. They provide a scope to understand the patterns according to the requirement of the wearer. They will help to understand the difficulties in fitting and then alter them according to the figure type. Therefore, paper patterns give good fit if properly drafted. These patterns also give an idea to alter the pattern to make a new style.

Key Words

Patterns: Pattern of garment is the blueprint based on which the basis of the fabric is cut.

Alter: To change a pattern so that it corresponds to body measurement.

Draft: Pattern drawn on a paper.

Short Answer Type Questions

1. What is drafting?
2. What is draping?
3. What is commercial pattern?

Long Answer Type Questions

1. Write about the contents of Paper Pattern.
2. Explain merits and demerits of Drafting and Draping.
3. What is Flat Pattern? Write the merits and demerits of the flat pattern.
4. Write the uses of Paper Pattern.

On Job Training

Visit a tailor to understand the types of pattern methods they are using.

Unit 4

Preparation of material for cutting

Structure

4.0 Introduction
4.1 Straightening of fabric grain
4.2 Off grain
4.3 Preshrinking and pressing of material

Learning Objectives

- To get the knowledge of preparing material for cutting
- To know the importance of grain.
- To know the methods of straightening the fabric.

4.0 Introduction

Always choose a good quality fabric, which is suitable for making garments. Firmly woven cotton fabric is good and easy to handle during sewing and pressing. Generally, cotton fabric must be pre-shrink to avoid shrinking at a later stage. Some fabrics available in the market may not have the lengthwise and cross wise threads at right angles to each other due to errors in finishing. The fabric for a garment must be grain perfect before it is cut. Such fabrics have to be finest, straightened for their grain before cutting. Without this preparation, fabric may not give a good fit and drape after they are constructed into a garment. Each fabric type requires a different preparation. Similarly, non-washable fabric cannot be dipped in water and also requires a different method of preparation. Preparing the fabric is the first step in constructing a well fitted garment.

4.1 Straightening the fabric grain

The ends of the fabric are either cut or torn when it is bought. Torn ends will be straight with the yarn cut. Ends should be examined to see if they were cut along crosswise yarns. If not, pull crosswise threads and cut. All corners of a fabric should form right angles. The lengthwise and crosswise grain lines should be at right angles to each other. Sometimes the ends of a fabric do not meet when folded because the fabric has been pressed on grain during finishing which should be corrected by stretching it.

1. Stretching method

Pull the fabric on bias. Open the fabric and pull the entire length of the fabric at a distance of 6" at each time. Then fold to see if the torn ends come together, if not, repeat the process.

Sometimes selvedges also may be out of line. Generally, they should lie on top of each other when the fabric is folded lengthwise. If the selvedge is not in line, it can be corrected by stretching and pinning the selvedges together. (Fig.4.1)

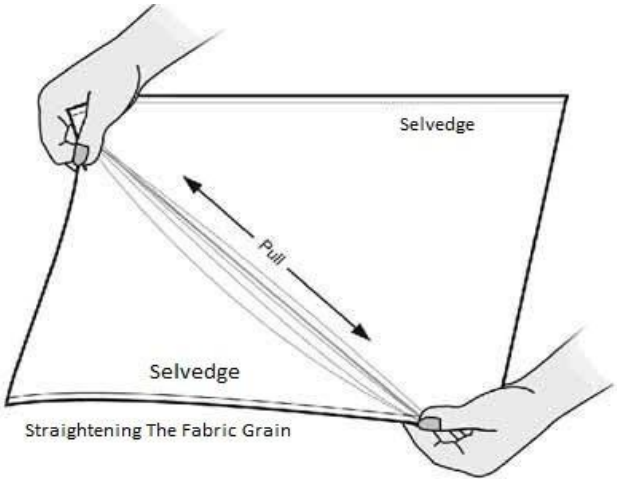


Fig. 4.1 straightening the fabric

2. Steam press method

If the above method does not work, clip the selvedges at intervals, sprinkle water on the fabric and press with a hot iron in the appropriate direction. You may press with a steam iron till the fabric becomes grain perfect.

3. Immersion method

Fold the fabric lengthwise, tack the selvedge together, immerse it in water until it is completely wet and then squeeze out excess water. Hang the fabric till half dry. Lay the fabric on a table and stretch the fabric to make it grain perfect.

4.2 Off Grain

A fabric in which the crosswise yarns are not running exactly at right angles to lengthwise yarns is referred to as off grain fabric. This happens because the fabric has been pulled out of shape and pressed in that position during finishing at the factory.

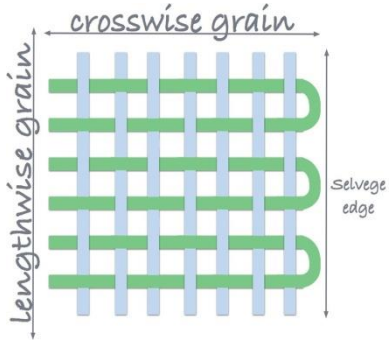


Fig. 4.2 off Grain

Preshrinking and pressing of material

Cotton fabrics which are not Sanforized and which have a low thread count should be shrunk. Cottons which have been given crease resistant or wash and wear finish usually do not need to be shrunk, as the finish itself reduces potential shrinkage.

Steps in Preshrinking the Washables

1. Fold the fabric lengthwise.
2. Pin selvedges and ends together.
3. Fold and immerse in luke warm water for 30 to 60 minutes.
4. Remove as much water as possible with hands and bath towels. Avoid wrinkling.
5. Lay fabric on flat surface dry, straighten warp and filling threads, smooth out any wrinkles. Avoid stretching.
6. Press if necessary when completely dry.

Preshrinking of Non-Washable Fabrics of Wool (Sponging)

This method is also called the sponging method followed for wool fabrics

1. Cut along crosswise threads on both ends.
2. Fold the cloth lengthwise down the centre with the right side in and place it on the table.
3. Wet an old sheet of material or other clean cloth in water.
4. Lay out the sheet over wool fabric. Fold the two together smoothen and cover with a dry cloth. Leave for several hours until the wool fabrics are damp through.
5. Spread the fabric flat and straighten grain lines and allow it to dry.
6. Steam press. Sponging of wool cloth removes wrinkles and straightens the grain so that it is easier to cut and fit.

Summary

The manner in which a fabric is cut in relation to grain line of the fabric determines the durability, fit and appearance of the garment. Preparing the fabric is the preliminary step in garment making by evening, straightening, shrinking and pressing of fabrics.

Key Words

Potential: The capability of a product of developing into a particular kind of product mentioned.

Shrinkage: It is decrease in the size or in dimensions.

Wash and Wear: A type of finish given to cottons which allows the fabric to be washed, dried and used without ironing.

Short Answer Type Questions

1. What is steam press method?
2. What is off grain?
3. Mention the methods of preparing fabric for cutting.
4. What is stretching method?
5. Which fabrics are straightened by immersion method?
6. What is sponging method?

Long Answer Type Questions

1. How do you straighten the fabric grain?
2. Explain the steps of shrinking washable fabrics.
3. Write about pre-shrinking of woolen fabrics.
4. Explain the methods used to even out fabrics in the widthwise grain.

On Job Training

Prepare the samples for grain and methods of straightening the grain.

Unit 5

Seams and Seam Finishes

Structure

Learning Objectives

- To understand different types of seams and their classifications.
- To learn the stitching and finishing of seam.
- Factors to be considered in the choice of seams for different fabrics and garments.
- Importance of Seam finishes.

5.0 Introduction

A seam is a method of joining two or more pieces of materials together by a row of stitches. In garment construction one of the major steps is the joining of different sections by seams. The purpose of most of these seams is purely functional and can be called as constructional seams. These constructional seams should be as flat as possible.

Examples of constructional seams are:
Shoulder seams, side seams, waist line seams, inside leg seam, armhole seam.

There are also some seams which are used for decorative purposes.

Types of Seams

- Constructional
  - Plain Seam
  - French Seam
  - Run and Fell Seam
  - Lapped Seam
- Decorative
  - Slot Seam
  - Piped Seam

Factors to consider while stitching seams:

1. Texture and durability of the fabric: when working with a heavy fabric French seam should be avoided.
2. Design and use of the garment: when making boy's sports shirt, a strong seam like flat fell seam should be used.
3. Shape of the seam: Seams may be straight or curved. Straight seams may be in vertical, horizontal or slanting direction on the dress. When joining curved edges. Plain seam will give a better finish then French seam and other types of seams.
4. Location of the seam in the garment: Seams in parts of the garments which may get stretched, during body movements should be more durable than others.
5. Current fashion: The modern trend is to use single seam that produces a graceful and well-fitting garment.

5.1 Plain seam

This is the most widely used seam because it is easy to make and requires less time and not complicated. It is used on all types of fabrics except on very transparent kinds. It is most suitable for firm fabrics that do not ravel and will not be subjected to hard and frequent laundering. Plain seam is used on skirts, coats, petticoats, blouses. It is used especially for side seams under arm seams and armhole seams.

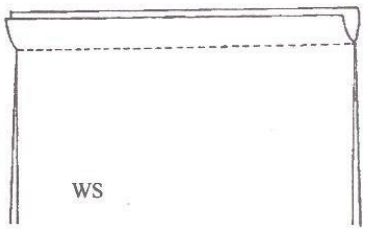


Fig. 5.1 Plain Seam

Method of stitching:

To make this seam place the two pieces of fabric to be joined together right side facing, matching the seam lines. Insert pins at right angles to the seam line and work a line of tacking following the seam line. Remove the pins and stitch the seam exactly on the seam line. Remove tacking and press seam open. (Fig. 5.1)

5.2 French seam:

This is the ridged seam. It is used on transparent and lightweight fabrics. Mainly used for body clothes and delicate blouses. It provides a neat and durable finish. The raw edges are completely enclosed. This seam should not be used on curves, such as arm holes, yokes.

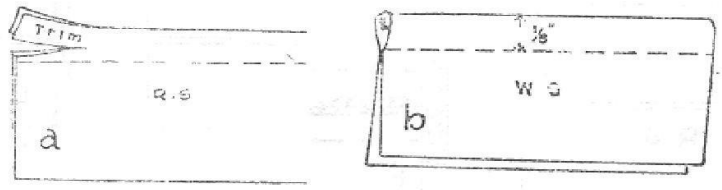


Fig. 5.2 French seam

Method of stitching

The seam is first sewn with wrong sides together then the seam allowances are trimmed and pressed. A second seam is sewn with right sides together, enclosing the raw edges of original seam. (Fig. 5.2)

5.3 Flat fell seam or Run and fell seam:

This is a durable seam. It is a flat seam. It is used on man's sport wear, T- shirts, work clothes and children cloths and pyjamaas. It is difficult to make on unused edges and on bulky fabrics.

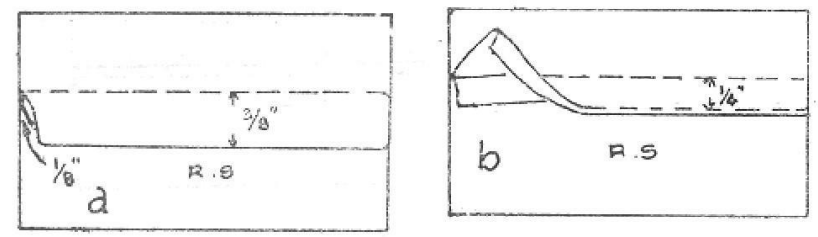


Fig. 5.3 Flat fell Seam or Run and Fell seam

Method of stitching:

Place the pieces to be joined wrong side facing and stitch on the seam line. Press both seam allowances together in the same direction and trim the under-seam allowance to 1/8" and the upper one to 3/8" turn under the raw edges of the wide raw seam allowance so as to make a smooth fold ¼" wide. Keep this fold in position with one hand. Machine stitch close to the folded edge on the right side of the garment. The right side of the seam will show 2 rows of stitching and wrong side will show only one row of stitching. (Fig. 5.3)

5.4 Lapped seam:

This seam is commonly used for joining a gathered section to a straight edge as in a yoke. Take the part of the garment which is to be laid on top and turned its seam allowances to wrong side. Place this piece on top of the second piece right side facing and matching the fold to the seam line accurately.

Fig. 5.4 Lapped seam

Method of stitching:

Take the part of the garment which is to be laid on top and turned its seam allowances to wrong side. Place this piece on top of the second piece right side facing and matching the fold to the seam line accurately. Stitch on the right side, stitching close to the edge of the material placed on the top. (Fig. 5.4)

5.5 Slot Seam:

This is a variation of lapped seam and it is used on the centre front back of the garment. This seam is used for skirt, coat and dresses, primarily for decoration sometimes it is combined with an inverted pleat.

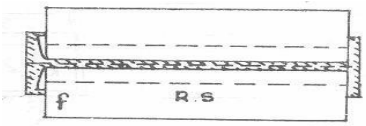


Fig. 5.5 Slot Seam

Method of Stitching:

Cut a strip of fabric of the same length as the seam itself and having a width more than twice of the seam allowance. Work a row of tacking down the centre of the strip. Take the two parts of the garments to the wrong side. Now the right side up place the folded edges on the strip so that the folds fall exactly on the tacked line of the strip. Tack close to the folded edges and top stitch carefully along each side of the seam about ¼" from the centre line, finally remove all the tacking. The back strip may be of the same fabric as the garment or a contrasting colour fabric cut on the bias. (Fig. 5.5)

5.6 Piped seam:

Sometimes a piping or bias binding gives a decorative finish to the garment. These types of seams are used at the bust line or yoke line of dresses. If a cord is enclosed in the bias strip the seam is called corded seam.

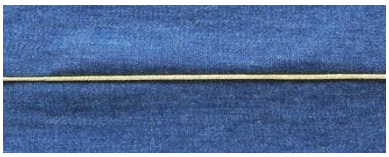


Fig. 5.6 Piped Seam

Method of stitching:

Prepare the bias piece fold it in the middle, tack it to the right side of one of the pieces to be sewn in such a way that the bias folds extents to 1/8" inside the seam line. Place the second piece on top of the first piece right side facing and stitch along the seam line. When the seam turned to the right side the piping or binding will extend between the 2 pieces of material contrasting colour bias strips are used to stitch piping. (Fig. 5.6)

5.7 Seam finishes:

Seam finishes are made to prevent fraying of the raw edges and thus make the seams more durable. They also provide neat appearance to the inside of the garment. Choose a seam finish that is quick and will not add much bulk to the garment.

There are several types of seam finishes and they are

1. Pinked finish
2. Edge stitch finish
3. Double stitch finish
4. Over cast finish
5. Herring bone finish
6. Bound seam edge finish

Pinked finish:

This is a quick and easy method and it is not bulky but it is not suitable finish for fabrics that ravel badly.

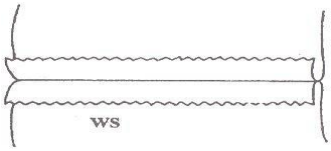


Fig. 5.7 Pinked finish

Method of making:

After stitching plain seam, trim of about 1/8" of the seam allowance using the pinking shears. Then press the seam open. (Fig. 5.7)

Edge stitch finish:

The seam is stitched and pressed open, and then turns ¼" on each seam edge and top stitch close to the fold without catching the garment. This finish is used on unlined coats and jackets where a wide seam allowance is available. This is a bulky finish and it is not suitable for deeply curved seams. (Fig. 5.8)

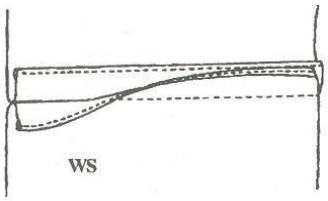


Fig. 5.8 Edge Stitch finish

Double stitch finish:

After making a plain seam work an extra line of stitching about ¼" from the raw edge. This stitch is not suitable for bulky fabric. (Fig5.9)

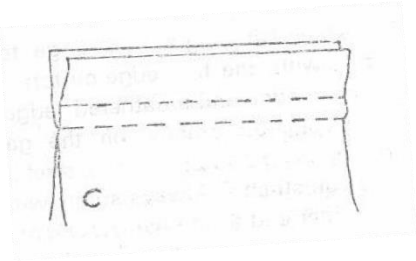


Fig. 5.9 Double stitch finish

Herring bone finish:

These finishes are done on raw edges and also hold down the curve turning make the seam felt. This is suitable for heavy materials like panel. After pressing the seam open herring bone stitches are worked on, the two raw edges catching the garment. (Fig. 5.10)

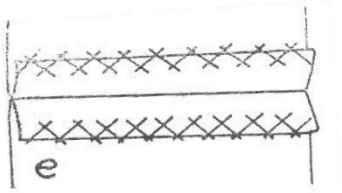


Fig. 5.10 Herring bone finish

Overcast Seam finish:

This is a common method used for both thick and thin materials. It is suitable for narrow seams that receive hardware of extra strain such as arm holes and waist lines. (Fig. 5.11)

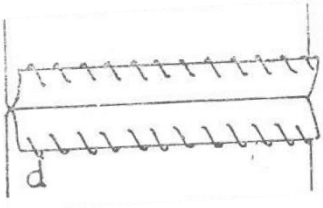


Fig. 5.11 Overcast Seam finish

Bound seam edge finish

A bound seam has each one of the raw edges of its seam allowance enclosed in a strip of fabric, lace or net 'binding' that has been folded in half, length wise. An example of binding is double fold bias type. The bindings fold is wrapped around the raw edge of the seam allowance and is stitched through, all thickness, catching underside of binding in stitching. Bound seams are often used on light weight fabrics including silk and chiffon and on unlined garments to produce a neat finish.

Summary

Seams, that join two or more pieces of materials and classified based on their purpose as constructional and decorative seams. Seams must be flat, neat, strong, inconspicuous and uniform in width. Its suitability depends on various factors like kind of garment, firmness. The various types of seam finishes are used on fabrics to prevent fraying and making the inside of the garment more attractive.

Key Words

Conspicuous: Something which people can see, notice very easily.

Facing: A piece of material sewed and used to finish a raw edge. It is turned to right or wrong side of the garment.

Seam Allowance: The portion of a garment allowed for the seam, usually 1/4 inch.

Raveling: Yarns pulled away from the fabric.

Short Answer Type Questions

1. What is seam?
2. Where are lapped seam used?
3. What are the uses of French seam and Slot seam?
4. What is a seam finish?
5. Which seam finish is quickly done and how?

Long Answer Type Questions

1. Explain about Flat fell seam and lapped seam.
2. What are the factors that affect in selection of seams and seam finishes?
3. Differentiate
   a. Lapped team and French seam.
   b. Plain seam and Slot seam.
4. Explain seam finishes with figures.

On Job Training

1. Make a survey of tailor units to check the seams commonly used by the tailors.
2. Identify types of seam finishes used in various dresses.

Unit 6

FULLNESS IN GARMENTS

Structure

Learning Objectives

- To be able to assess the correct fullness and neatness of the garment.
- Understanding the various methods used for introducing the fullness in the garment.

6.0 Introduction

In garment construction not only, sections are joined but the sections are shaped to fit the curves of the body. There are various ways in which garments are shaped, depending on the amount of curve needed in the garment and the design of the garment. Fullness of material is an important feature of the styles as well as necessity for ease of movement in a well fitted garment. Darts, tucks, pleats, gathers are some of the means for introducing fullness.

Fullness is introduced into garments for various reasons such as

- To give good shape and proper fit to the garment.
- To allow freedom of movement and comfort to the wearer
- To make the garments look attractive.

6.1 Darts

Darts are used to shape a flat piece of fabric to fit the curves of the figure. A wide dart will create more shaping and a narrow dart will create less shaping. Dart may be decorative and functional or both. Functional darts are intended for fitting the body curves-chest, hip, shoulder and elbow. They should point to the fullest part of the curve. In blouses darts are used for chest part and waist line. The standard dart

is in triangular shape that is wide at one end and pointed to the other. Darts are two types

a. Single dart:

Single dart is otherwise known as standard dart. It is triangle in shape i.e., wide at one end and pointed at another end. To make this dart transfer the dart marking of the paper pattern to the fabric. Find the centre point on the wide end of the dart make a fold to the tip of the dart, keeping the right side ends of the fabric together. This fold is basted exactly along the stitching line markings and later machined from the wide end to narrow end. (Fig. 6.1)

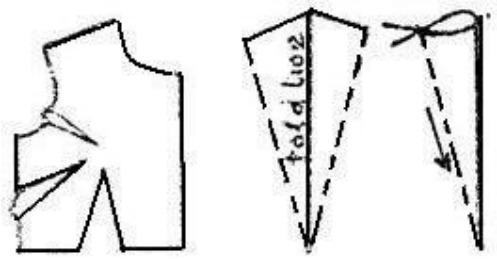


Fig. 6.1 Single dart

b. Double dart:

Double darts are wide at the middle and pointed at the end. These darts are used when single piece garments are stitched from shoulder to a level below the waist. Carefully transfer the dart marking of the paper pattern to the fabric, start from the middle where the dart is widest and stitch to one end and go back to the middle stitch to the other end. (Fig. 6.2)

Fig. 6.2 Double dart

c. Pressing dart:

Darts should be pressed after stitching. The general rule is to press vertical darts towards centre front or centre back and horizontal darts downwards. For heavy fabrics cut along the fold of darts with in 1" of the point and press them open.

6.2 Tucks

A tuck is a fold of fabric stitched by running stitch or machine stitch on the right side of the garment as means of giving shape to the garment to suit the body, to hold fullness and to add a decorative finish to the garment. They can be used in

groups or clusters and in graduated widths. Regularity of the tucks and even spacing are essential to the beauty of tucks.

a. Pin tucks:

These are tiny dainty tucks used on baby's clothes and fine blouses. They are usually less than 1/8 inch wide. They can be stitched on thin fabric. (Fig. 6.3)

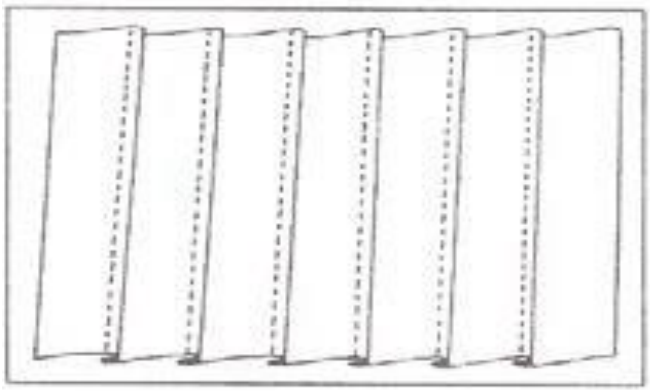


Fig. 6.3 Pin tucks

b. Plain tucks:

These are broader than pin tucks. They can be used on yokes and pockets. (Fig. 6.4)

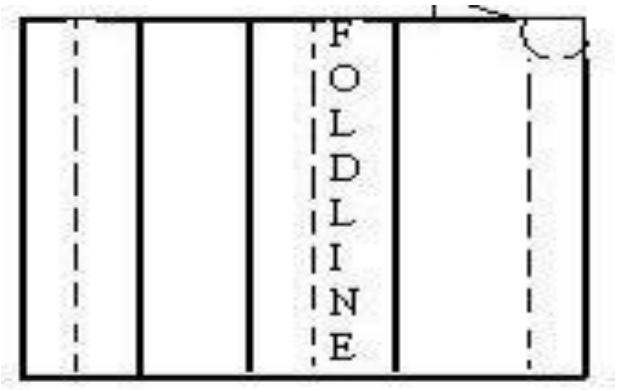


Fig. 6.4 Plain Tucks

c. Cross tucks:

When rows of tucks are stitched along the fabric in both horizontal and vertical directions, the decoration is called cross tucking. First stitches the vertical tucks and press them to one side. Then stitch the horizontal tucks. (Fig. 6.5)

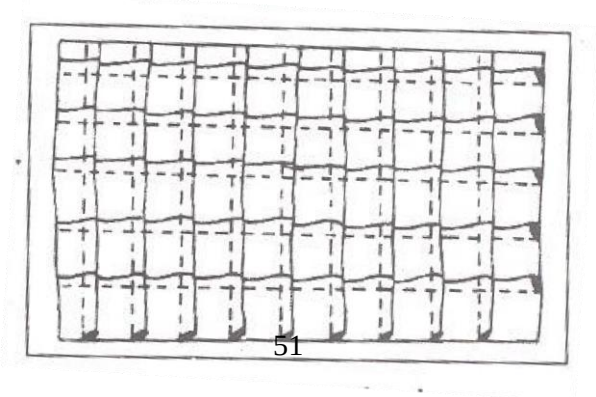


Fig. 6.5 Cross tucks

6.3 Pleats

Pleats form folds in the fabric and give fullness and shape to a garment. Pleats are introduced usually at the waist line of skirts and dresses to provide fullness evenly. They also give comfort to the wearer and decoration to the garment. Pleats generally requires about 3 times of its finished width. Firm and crisp fabrics can hold pleats better and so are preferable. Pleats are of different types. Some of them are given:

a. Knife pleat

They are usually about ½ inch to 1 inch wide and are turned towards the same direction. The direction may be reversed at centre front or centre back of the garment depending upon the design. (Fig. 6.6)

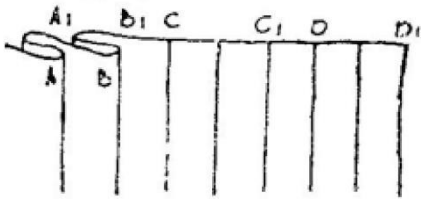


Fig. 6.6 Knife Pleats

b. Box pleat

Two knife pleats turned away from each other i.e. one to the left and one to the right form a box pleat. (Fig. 6.7)

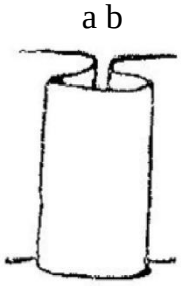


Fig. 6.7 Box Pleat

c. Inverted Box pleat

It is the opposites of a box pleat. It is made of two knife pleats turned towards each other. So that the folds meet in the middle on the right side of the garment. (Fig. 6.8)

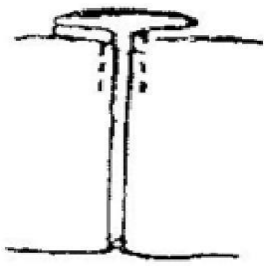


Fig. 6.8 Inverted Box Pleat

6.4 Gathers

Gathering is an effective and decorative way of distributing fullness over a given area in dress making. Gathers are often used at yoke lines, waist lines, necklines and upper and lower edges of sleeves. Gathering is done by different methods such as:

a. Gathering by hand

Fasten the thread securely and work rows of running stitches ¼ inch apart-1/8 inch are made. Draw the ends of threads until the section measures the desired length and secure the thread by winding round a pin. (Fig. 6.9)

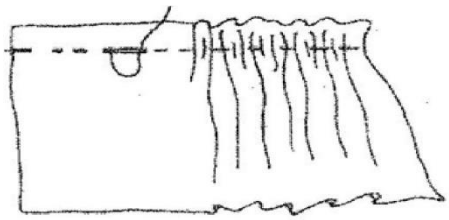


Fig. 6.9 Gathering by Hand

b. Gathering by machine

Adjust the machine for long stitch and loosen the upper tension slightly. Now work two rows of machine stitches ¼ inch apart. Distribute the fullness evenly by pulling both bobbin threads together. (Fig. 6.10)

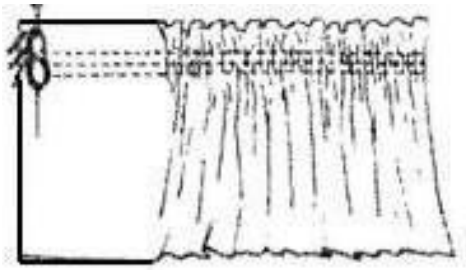


Fig. 6.10 Gathering by Machine

c. Gathering by using elastic

Gathers can be made stretching a narrow strip of elastic and stitching by placing it on the part of the garment which is to be gathered. (Fig. 6.11)

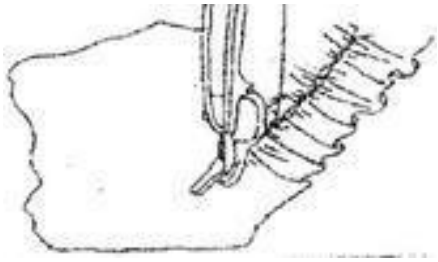


Fig. 6.11 Gathering by using elastic

6.5 Shirring or Gauging

When several rows of gathering are used for a decorative finish, these are termed as shirring. The rows should be evenly spaced. Shirring appears as decorative feature at the shoulder, waistline, at the lower edge of the sleeve. It also allows a certain degree of stretchin g to which the frill is attached.

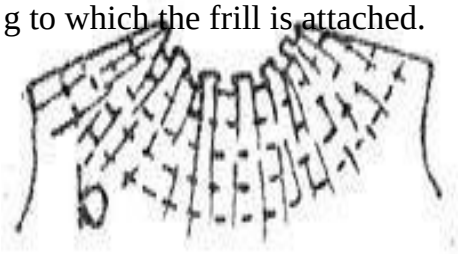


Fig. 6.12 Shirring or Gauging

6.6 Flares

Flares are introduced usually into skirts for adding fullness and decoration at the hemline. Sleeves can also be flared. Flare in a basic skirt is the difference between its measurement at the hem line and hip line. To introduce flare into skirt, slashes are made starting from the hemline to the required height. These slashes should be regularly spaced around the hem drafted on another sheet of paper creasing flare. (Fig 6.13)

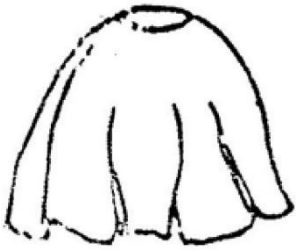


Fig. 6.13 Flares

6.7 Godets

These are wedge shaped pieces which are usually set into a skirt so that the wide side of the wedges becomes a part of the hem of the skirt. The godet may be set into a seam of the skirt or the skirt may be slashed so that the slashed edge, form the seams to join the godet. (Fig. 6.14)

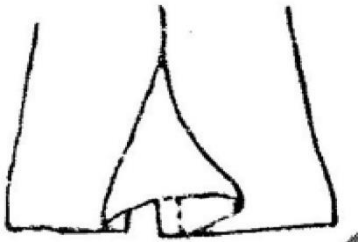


Fig. 6.14 Godets

Summary

Fullness is introduced into the garment to give good shape, proper fit, to make it attractive and to allow freedom of movement and comfort to the wearer. Fullness can be introduced using darts, tucks, pleats, godets, flares, and gathers. Depending on the type of material used the type of fullness should be selected.

Key words

Enhance: To improve its value, quality or attractiveness.

Slash: Cutting with a scissors without separating parts or make a cut

Short Answer Type Questions

1. What is a dart?
2. What is a tuck?
3. What is shirring?
4. What are the different methods of gathering?
5. Differentiate between box pleat and inverted pleat.

Long Answer Type Questions

1. Differentiate between gathering and shirring.
2. Explain about types of tucks.
3. Describe the different methods of making pleats.
4. Explain types of darts.

On Job Training

Prepare sample with different types of materials. Record of samples has to be mounted neatly on any dark colour of sheet of size A3 size.

Unit 7

PLACKET OPENINGS

Structure

7.0 Introduction

Plackets are finished openings made in order to put on or take off a garment easily, when the garment is in use, plackets are kept closed (for good fit) with the aid of fasteners such as zipper, buttons, button holes, hooks and eyes. They are used at waist lines, necklines, wrists and other snug fitting parts of garments. A placket generally may be made in an opening. This gives a stronger and better finish. Sometimes plackets are made in a seam, or in a slash cut in a garment. All openings for women's garments fasten right over left irrespective of where they are located. For gents opening, they should be left over right when worn.

7.1 Standards of a good placket:

a. Neatness and invisibility

Unless used as a decorative detail, placket should be as inconspicuous and flat as possible. It should not be bulky, puckered, or sagged. Fastening should hold securely and there should be no gapeing edges.

b. Suitable length and convenience

Neck openings must admit the head easily.

c. Strength

Openings are subjected to certain amount of strain while fastening and should be strengthened at the closed ends.

d. Correct lapping

Plackets should lap right over left for women's garments and vice versa for men's garments.

e. Suitability

Type of placket used, should be suitable to the kind of garment on which it is used, its position in the garment, texture of the fabric, age and sex of the wearer and current fashion.

7.2 Tailored placket or kalidar kurta placket:

This is commonly used on men's shirts, sleeve openings in jubbas, guru shirts and children dresses. When used on the children and lady's dresses, strip used for placket may be of a contrasting material for decorative effect. (Fig. 7.1)

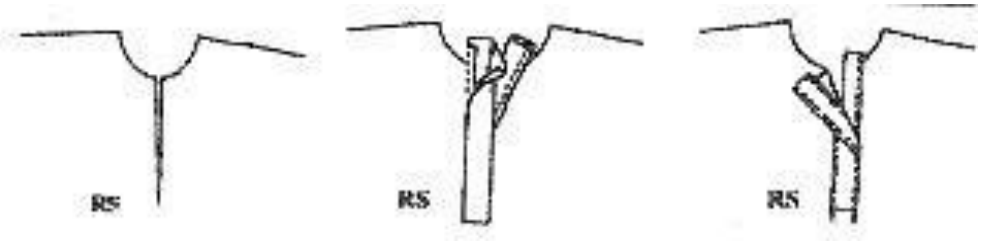


Fig. 7.1 Tailored Plackets

Steps to be followed

1. Two separate strips are cut for under lap and overlap.
2. For under- lap cut one strip of 1 ½ inch wide and exact length of the slit.
3. Keeping one end of the strip exactly in line with the end of the slit and with the right side facing, stitch a ¼ inch seam joining the edge of the strip to the correct edge of the sleeve opening.
4. Now fold ¼ inch under on the free edge of the strip and hem or machine this folded under lap strip tacked to the wrong side of the garment.
5. For over- lap take a shaped strip, cut a strip of 21/2 inch wide and 1 ½ inch longer than the slit.
6. Shape the bottom side of the strip into a pointed 'v'. Keep the right side of the strip facing the wrong side of the garment and tack the short side of the strip to the free side of the placket opening on the seam line.
7. Machine stitch and bring this overlap strip over to the right side of the garment.
8. Turn under the seam allowances and adjust the position of the strip so that it will overlap the under-lap binding. Topstitch the strip to the garment.

7.3 Zipper placket

There are several methods of applying zippers. The choice depends on the position of the zipper in the garment and the type of garment. Zippers are usually concealed, either with two overlapping fabric edges or with one. Zipper plackets are examples of inconspicuous placket. At the former shows two lines of stitching and referred to as slot seam zipper placket. The later is lapped seam zipper placket and

only one line of stitching is visible on this. Generally, the lapped seam application is used on side opening in garments and slot seam placket on centre back and center front openings as shown in the (Fig. 7.2)

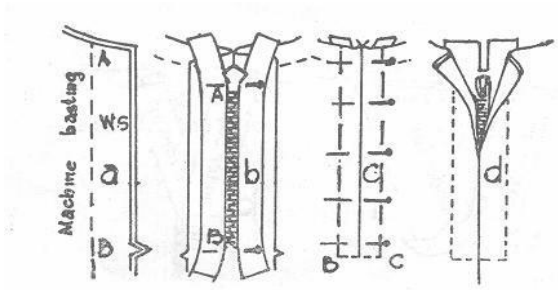


Fig. 7.2 Zipper Placket

7.4 Narrow bound placket

This is also called two-piece placket. This is used on seam of skirts or petticoats and back seam of dresses. For making this placket cut two placket strips with length equal to the length of the opening with allowance. Width of one strip may be equal to the width of placket with allowances and the other strip width will be the double width of the placket plus allowances. In this placket, the under-lap side is finished binding and the overlap with facing. Under lap is finished by creasing the strip back over the seam bringing its free edge and hemming the fold to the stitching line. This forms the bound side of the placket and should be ½ inch to ¾ inch wide. For the overlap section placket strip is folded fully to the wrong side and evaluate the width with the under lap. Long stitches are used at the base of the placket catching the under lap and overlap together. This can be done with hand to avoid visible machine stitches on the right side. (Fig. 7.3)

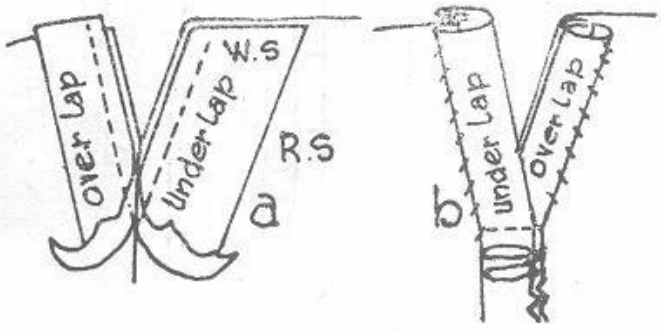


Fig. 7.3 Narrow bound Placket

7.5 Selection and choice of plackets on various garments.

The following points should be kept in mind while selecting the plackets

1. A good placket should be as inconspicuous as possible. It should be flat, neat and have sufficient lap so that it does not gape. There should be no bulges or sewing seen on the right side as far as possible.
2. The fabric of the placket should be the same on that of the garment as far as possible.
3. When the garment is in use, plackets are kept closed with the aid of fasteners such as buttons, press buttons, hooks eyes.
4. The plackets are used at waistlines, wrists and other snug fitting parts of garments.
5. All openings for women's garments fasten right over left irrespective of where they are located.
6. For opening in gent's garments, they should be left over right when worn.

Summary

To make a garment easy to put on and to remove plackets are provided. Based on their position and suitability plackets are made conspicuous, placket should be neat, flat and hold securely. Continuous bound plackets, bound and faced plackets and zipper plackets are examples of inconspicuous plackets. Tailored plackets are conspicuous plackets commonly seen on men's shirt sleeve openings and on neck openings on kurtas, children dresses.

Key Words.

Slash: A long, deep cut.

Hem: This is hand stitch, used to secure down a folded edge of material.

Hook: A hook is a bent piece of material or plastic that is used for catching or holding or hanging up things.

Short Answer Type Questions

1. What is a placket?
2. Where are the plackets used?
3. Write the uses of zipper placket.
4. What is a tailored placket?

Long Answer Type Questions

1. Write about the standards of a good placket.
2. Write the procedure of Narrow bound placket.
3. How do you stitch tailored placket?
4. Write the selection and choice of placket on various garments.

On Job Training

Illustrate with sketches the various types of plackets on different garments.

Unit 8

NECKLINE FINISHES

Structure

8.0 Introduction
8.1 Preparation of Bias strip
8.2 Facings
8.3 Bindings

Learning objective

- Preparation of bias strips
- Application of bias facing and binding
- Application of fitted or shaped facing
- Application of decorative facing
- To gain the knowledge in choosing, correct finish to neckline

8.0 Introduction

One must take great care in designing and finishing the neckline of a dress, because this is the most conspicuous part of the dress.

The design and style of the neckline and its finish should be selected to suit the wearer and should be appropriate to the type of fabric used. The general rule is to select a neckline related to the shape of one's face and the design of the dress with neither too much contrast nor too much similarity. For a neckline with fullness a soft material is needed. A material with large checked design is not suitable for cutting a round neckline. The two common neckline finishes are facing and binding. Stay stitching is done preliminarily to avoid stretching of the neckline. To do this, use longer stitch than ordinary stitching, on single layer with a seam allowance or 1/8 from seam line towards the seam edge with a matching thread. This also helps the fabric from raveling and getting out of shape.

For necklines bias strips are very convenient to use. Bias is a general term referring to any slanting line of the straight grain fabric. True bias falls on a diagonal line at 45" to the lengthwise and crosswise grains. It has the maximum elasticity or in other words it stretches more than any other direction on cloth. Therefore, a true bias strip is used to finish certain specific raw edges. They are useful especially in finishing curved edges such as neckline, sleeveless, armholes and scallops. A straight piece of material attached to finish a curved edge looks bulky and untidy. The elasticity of bias strip permits it to stretch or contract and thus takes the shape of any curved edge giving it a flat smooth finish. Bias strips can be applied as facings and bindings. In striped, checked or contrasting coloured material it gives a decorative finish when used as a binding or facing, it is applied on the right side of the garment.

Neckline Finishes

- Facing
  - Bias
  - Fitted
  - Decorative
- Binding
  - Single
  - Double
- Collars

Importance of Stay Stitching:

Stay Stitching is generally done to the curved, cut edges of the garment pieces to stop raveling and stretching out of shape. It is done immediately after cutting and on single layer material. It can be done either with hand or machine with long stitches with a contrasting colour thread.

8.1 Preparation of Bias Strip:

True Bias falls on a diagonal line at 45 degrees to the lengthwise and crosswise grains. Before finding the true bias, the crosswise edge should be straightened. Fold one corner of the fabric so that the selvedge lies along a crosswise thread. A right angle is formed by the selvedge. The long side of the triangle is the true bias.

a. Cutting Bias Strips:

Fold the fabric diagonally so that the lengthwise threads of the folded part fall parallel to the crosswise threads on the rest of the material. (If the grain lines cannot be clearly seen, mark the lines with chalk first) Using a ruler, measure from the fold the desired width of bias strip and draw parallel lines and cut strips along the marked lines and trim off ends along warp threads. (Fig. 8.1 (a))

b. Joining Bias Strips

Place the two strips to be joined right sides facing and the edges of the cut ends coinciding. The strips will now be at right angles to each other. Place the top strip ¼ inch beyond the other so that the sharp points are at the ends of the strips projecting on either side. Join the points where the sides of the two strips intersect. Press the seam open and trim the seam projections showing on right side press the seam open. (Fig. 8.1 (b), (c))

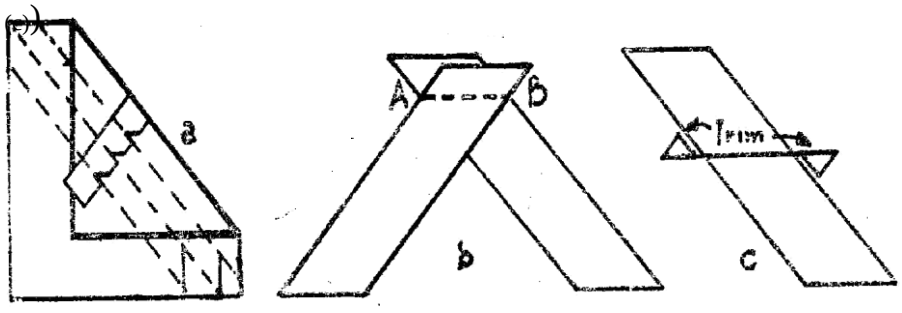


Fig. 8.1 Cutting Bias and Joining Bias Strips

8.2 Facings

These are used to provide a neat finish to the raw edges in a garment and to support the shape of necklines, armholes. When the edge to be faced in a straight line, the facing may be cut in one piece with the garment section. Usually facings are applied separately. There are two types of applied facings. They are Bias facing and shaped facing. Facings are usually turned fully to the underside of the garment and will not show when the garment is worn. Sometimes facings are turned to the right side of the garment and fixed for decorative effect.

a. Application of Bias Facing

Stay stitch edge of the garment to be faced. Prepare bias strip of width equal to finished width of facing with seam allowances and long enough to face entire edge. Tack bias strip to the edge of garment, right sides facing and beginning at a seam. For inward curves to be faced the bias must be eased and for outward curves it must be stretched (easing means holding bias strip slightly loose at the seam line). With the bias on top stitch bias to the edge of the garment avoiding any stitch on both the edges trim the seam to ¼ inch clip at curves and turn to wrong side. At this point under stitch the facing to the seam.

Turn under about ¼ inch along the outer edge of the bias strip and tack on to the garment, making sure that the facing is not visible from the right side of the garment. Now hem or slip stitch the facing to the garment. When finished the bias facing should be about ¼ inch wide. (Fig. 8.2)

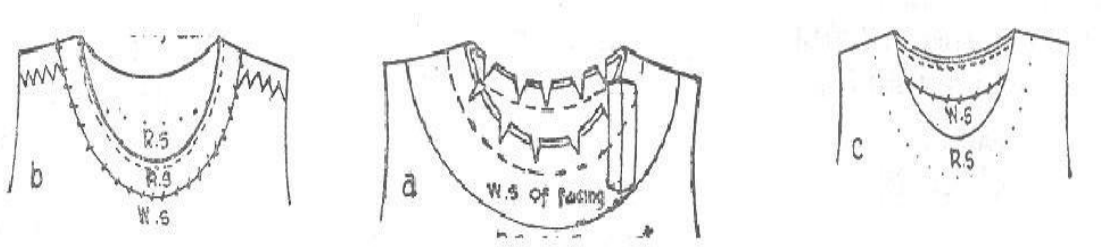


Fig. 8.2 Application of Bias Facing

b. Application of Shaped Facing

The shaped facing is cut to the exact shape of the garment edge to which it is to be applied. Usually it is cut on the same grain as the section of the garment it faces, to avoid stretching of that part of the garment. Shaped facing is often used to finish any neckline other than square, 'V 'necklines and scalloped edges. It is easier to apply than bias facing and is less conspicuous. It is easier to cut separately for front and back.

After cutting the front and back facings, attach with a plain seam at the shoulder lines, trim the seam and press it open. Finish the outer edge and stitch it. Carefully tack the facing to the garment section, right sides facing and seam lines centre lines and notches matching. After this trim, grade and clip seam edges as for bias facing. Turn the facing to the wrong side, under stitch it to the seam and hem, or slip stitch the folded edge of the facing to the garment. (Fig. 8.3)

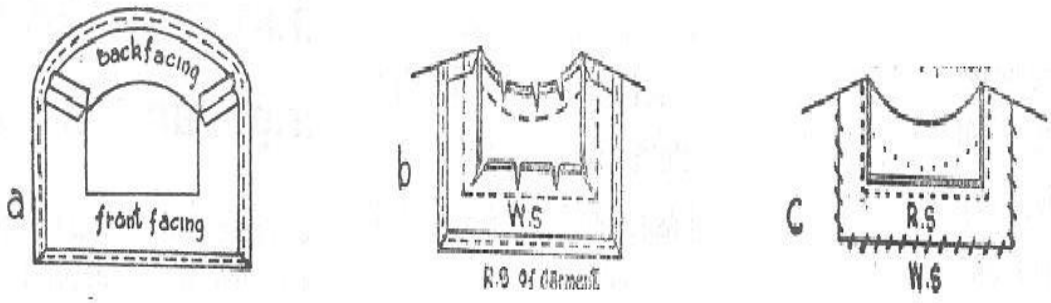


Fig. 8.3 Application of Shaped Facing

c. Application of Decorative Facing

Decorative shaped facing is applied almost the same way as a fitted facing. But certain differences arise because decorative facing is to appear on the right side of the garment. First the right side of this facing must be matched to the wrong side of the garment to ensure that it will be right side out when finished.

Secondly, if it is to be applied to the neckline, the shoulder seam of the garment should be reversed just inside the outer finished edge of the facing. This is to prevent the raw edges of the shoulder seam. Unlike fitted facings, decorative facings are usually made with designs along the outer edge. Particularly, care should be taken to see that the right and left halves are symmetrical in design and shape.

Bias facings also can be applied on the right side of the garment for decorative effects, but no edge designs are possible with this facing because it cannot be made very wide. The decorative effect has to be obtained by the use of material in some harmonizing colour or with prints like checks, stripes and dots etc. (Fig. 8.4)

Fig. 8.4 Application of Decorative Facing

8.3 Bindings

There are two kinds of bias bindings. Single binding and double binding or French binding. Binding may be prepared or may be bought readymade.

Bias Binding

Bias binding is used to finish and strengthen raw edges and to add a decorative trim to a garment. It shows both on the right and wrong sides. It is used to finish necklines, armholes, sleeve edges, front closings, collars, cuffs and seams. It can be adapted equally well to straight, curved, gathered and irregular edges. Bindings are two types. They are

a. Single Bias Binding
b. Double Bias Binding

a. Application of Single Bias Binding

Cut a bias strip that is twice the finished width plus two seam allowances. Tack the strip to the garment right sides facing. For binding, stretch the bias on inward curves and ease it on outward curves. Stitch the binding to the garment with a plain seam. Trim the seam as wide as the finished binding. Turn under 1/8 to ¼ inch on the outer edge of the bias and folded it over the seam on the wrong side. Now hem the fold to the line of stitching using hemming stitches. (Fig. 8.5)

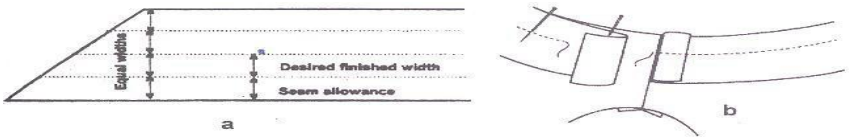


Fig. 8.5 Single bias binding

b. Application of Double Bias Binding

Double bias binding or French binding is used on fine fabrics. For this, cut bias strip that is six times the desired finished width. Fold the strip in half, wrong sides together, and press. Stitch raw edges of binding to the garment on the right side and hem the folded edge to stitching line on the wrong side. (Fig. 8.6)

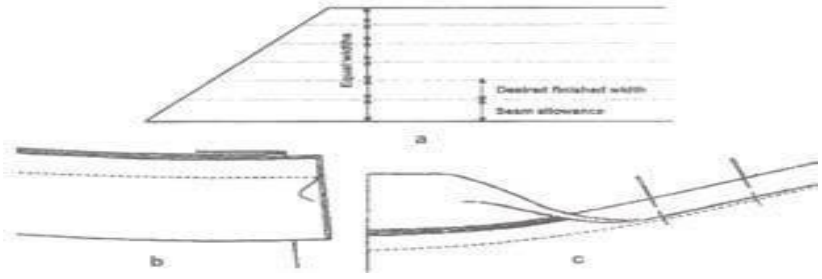


Fig. 8.6 Double bias binding

Summary

Neck finishes are applied on neckline of a garment to hold the shape of the neckline and make the garment appear neat. It can be shaped in different ways and styles, particularly in lady's garments. There are two kinds of neck finishes. They are facings and bindings. Facings are sometimes applied from the right side turned to the wrong side and fastened. A shaped facing is attached from the wrong side and turn over to the right side and machine stitched. Another method of finishing neckline is by means of a binding. Binding are of two kinds: Single bias binding and double bias binding. In single binding a bias strip is attached to the neck line turned and hemmed on the stitching line. A folded bias strip is attached to the neckline in double binding turned and fastened on the stitching line. The selection of design and style of the neckline depends on the wearer and type of fabric used.

Key Words

Trimming: It is decoration that is attached to a garment.

Elasticity: The elasticity of a material or fiber is its ability to return to its original shape, size and condition after it has been stretched.

Bulky: Fabric that is large and heavy.

Bodice: The bodice of a dress is the part above the waist.

Short Answer Type Questions

1. Define true bias.
2. With the help of a diagram explain how bias strips are joined.
3. Why are facings used on necklines?
4. State the methods of finishing necklines.
5. Where are facing and bindings used?
6. Name the kinds of facing.
7. Name the kinds of bindings.
8. Where is double bias used?

Long answer type questions

1. Describe facings using figures.
2. Explain about bindings in detail. Use appropriate figures.
3. Write the procedure for finishing a neckline with double bias binding.
4. What is fitted facing? When do you use it? Write the method of constructing.

On Job Training

Prepare samples by applying different ways of finishing necklines.

Unit 9

FASTENERS

Structure

Learning Objectives

- Discuss how the various types of fasteners can be used on different garments
- Make fabric sample showing the working of fasteners.

9.0 Introduction

There are various types of fasteners; some are decorative and conspicuous while some are meant to be inconspicuous. The common fasteners are buttons, button holes, hooks and eyes, press buttons, shank buttons, metal buttons, zippers etc. Fasteners should be selected to suit the colour, design and texture of the fabric, the style and use of the garment. One should also consider the age and sex of the wearer. For example, buttons and button holes are generally used for men's shirts, trousers etc., just as press buttons and hooks and eyes are commonly used for ladies blouses and children's dresses.

9.1 Buttons and Button holes

Buttons should be selected carefully to suit both the weight and colour of the fabric. These have functional as well as decorative uses. Contrasting coloured or self-coloured buttons in different shapes may be arranged in groups or at regular intervals to produce an attractive effect. They should be sewn securely by a strong matching thread in such a way that it allows the buttons to close under the button without puckering the fabric.

Fig. 9.1 Buttons

Button holes are slits cut in garment to hold buttons in place. The raw edges of the slits are finished with buttonhole stitches, zigzag stitches or fabric binding made of self or contrasting material is used.

Fig. 9.2 Button Hole

Button holes should be worked on the overlap before the buttons are fixed. They may be placed vertically or horizontally on the garment. Horizontal button holes hold the front securely even on the tight-fitting garments. They being about 1 cm outside the centre front line cross front line and extend into the garment.

Fig. 9.3 Horizontal and Vertical Button Holes

Vertical button holes are worked on the length wise grain and exactly on the centre front line parallel to the centre front edge. They are used for shirts, pants, fly opening etc., where there is no great strain across the garments.

Length of the button hole

The length of the button hole should be the diameter of the button plus about ½ cm (or the thickness of the button).

Sewing of Buttons:

These have holes either two or four through which the button is sewn. When sewed flat, this button can be used as a closure for thin light weight fabrics or a decorative button.

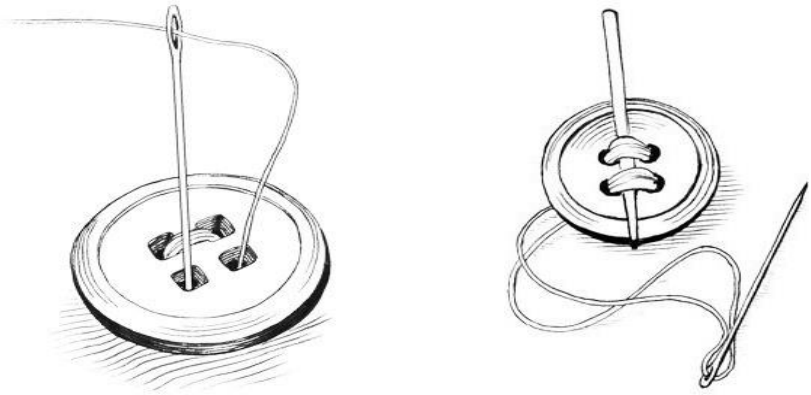


Fig. 9.4 Sewing of Buttons

Buttons with four holes can be sewed on, in a number of interesting ways. The thread can be worked through the holes to form square or parallel lines. To sew a button flat to a garment several small stitches are taken at position marked for button location.

Then place centre button over marking and sew in place through holes of the button. Fasten stitches on wrong side or between garment and facing.

Working of Button Holes:

Button holes are made by cutting a slit in the fabric equal in length to the button and then finishing the raw edges of this slit with either blanket or button hole stitches. The ends of this button hole may either be finished or be tacked. A strong preferably a single strand or double strand of matching thread is used. Stitch depth can be from 1/16 to 1/8 of an inch depending on the fabric types and size of button hole.

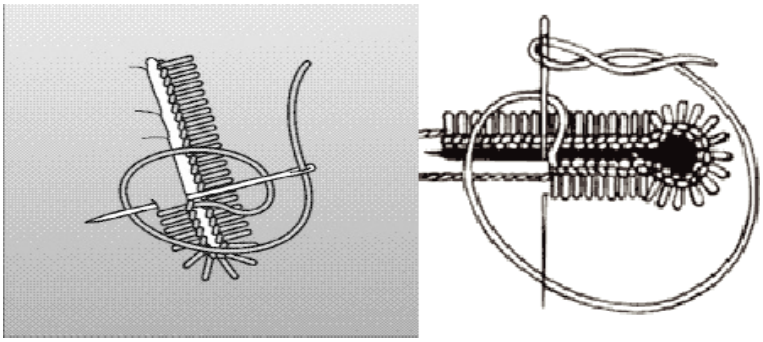


Fig. 9.5 Working of Button Holes

Method of Working Buttonholes:

1. After deciding stitch depth (1/6" to 1/8") necessary lines are marked and a rectangle is stitched to the stitch depth.
2. Using a sharp pointed scissors the centre line is cut from one end to the other.
3. Working from right to left with needle, button hole stitches are made to one end of the slit.
4. 5 to 7 stitches are made now, around in even depth and continued to finish the other side of the slit.
5. After reaching the other end of the opening, several long stitches are made extending to depth on both sides to form the base of the bar track.
6. Over their bar track a row of even buttonhole stitches are made.
7. Each button hole has a fan edge and a square end on either side of the slit.

9.2 Shank buttons

It is stitched by passing needle through fabric and shank and then back through fabric. Stitching is done through fabric and shank until button is secure and fastened on the underside. A shank also is made to flat button by placing a pin over the holes of button and securing it to the garment over the pin. The pin is removed and the button is pulled up so that the loose thread is below the button which can be made into a shank by covering threads with stitches.

Fig. 9.6 Shank Buttons

Button holes should be worked on the overlap before the buttons are fixed. They may be placed vertically or horizontally on the garment. Horizontal button holes hold the front securely even on tight fitting garments. They being about 1 cm outside the centre front line cross front line and extend into garment.

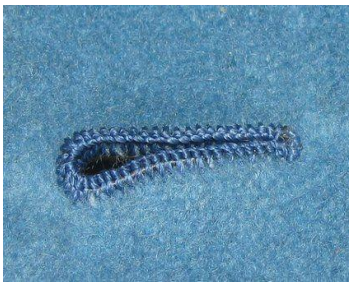


Fig. 9.7 Shank Button Hole

Vertical button holes are worked on the length wise grain and exactly on the centre front line parallel to the centre front edge. They are used for shirts, pants, fly opening etc where there is no great strain across the garment.

9.3 Metal Buttons:

In modern clothing and fashion, metal buttons are classy and stylish uplifting any garment. They are available in elegant colours with unique artistic style. Metal

buttons sewn on to garments exclusively for purpose of ornamentation. These buttons are used on coats, blazer, suits, sports coat, uniform, jacket etc.

Fig. 9.8 Metal Buttons

9.4 Zipper:

Zippers are of different types according to the purpose, as neck zippers, dress placket zippers, skirt placket zippers, trouser fly zippers, and light weight and heavy weight and separating zippers for jackets. Some are adjustable. Colour of zipper should be closest to the fabric colour. They are available in metal and plastic too.

Fig. 9.9 Zipper

9.5 Hooks and Eyes:

These are used on plackets where there is crosswise strain. They form an inconspicuous closing. They should be placed on such that there is no gaping at the opening. The hook should be placed 1/8 inch inside the finished edge of the overlap on the wrong side. Buttonhole stitches or over casting stitches are made around the rings of the hooks. The stitches should not be seen on the right side.

Fig. 9.10 Hooks and eyes

The eyes may be metal or worked with thread. Thread eyes are used on blouses and dresses made of fine fabrics. They can be made to match the colour of the garment so as to be inconspicuous. After marking the position of eye a few back stitches are worked long enough for the hook to pass and the buttonhole stitches are worked over these threads. Threads are fastened firmly on wrong side.

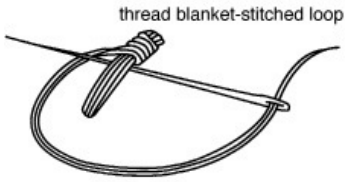


Fig. 9.11 working of thread eyes

Summary

These openings of garment can be closed with different fasteners. The types of closures selected will depend on the position, the amount of strain it will receive and whether it is to remain concealed or form a decorative feature on the garment. Fasteners should be selected to suit the colour, design and texture of the fabric, the style and use of the garment and the position of the placket.

Key Words

Conceal: To conceal is to cover or prevent or remain unrevealed.

Purpose: The reason for which it is made or done, having a definite aim and of being determined to do it.

Gaping: When the fasteners are not placed properly, an opening is visible in the placket.

Closure: To close an opening.

Slit: A slit is a long narrow cut.

Short Answer Type Questions

1. What is a fastener?
2. Name the types of button holes.
3. List the fasteners used on children's garments.
4. Name the garment on which hook and eyes are used.
5. List the garments on which vertical button holes are used.

Long Answer Type Questions

1. Write in detail the methods of stitching a button and button hole on garments.
2. How do you stitch a hook and eye? Explain.

On Job Training

Check the various garments and identify whether the fasteners applied are suitable or not.

Glossary

Alter: To change a pattern so that it corresponds to body measurements. To change a portion of garment so that it fits the body

Awl: It is small, sharp-pointed tool used to punch small, round holes for marking in paper or leathers.

Basting: It is a temporary stitch used to hold two or more layers of garment pieces together, before actual permanent stitches are made.

Back stitch: It is a permanent hand stitch. The stitch resembles machine stitch useful for mending ripped out seams etc.

Balance wheel: It controls the operation of the sewing machine. It is located on the right side of the machine. It is driven by hand or belt in the industrial machine. It controls the movement of the needle bar and drives the machine.

Bias: Fabric folded in diagonal direction to its lengthwise threads is said to be in bias. It has maximum stretch.

Bias Facing: It is a neat finish given to the raw edges in a garment using bias piece. It supports the shape of neckline, armholes, collars etc.

Binding: Also called as bias binding, a narrow uniform width of bias fabric used to finish the raw edges in the garment.

Bobbin: It is a round metal or plastic object to hold the bottom thread in sewing machine. With its case it moves into a position to catch the top thread and form the stitch as the needle is lowered into bobbin chamber.

Bobbin winder: A simple mechanism used for winding thread on the bobbin.

Bound seam: This is formed by folding a separate binding strip over one or more plies of pieces material and seaming the strip with one or more rows of stitches. They are frequently used as an edge finish at necklines, hems and sleeve plackets.

Box pleat: It is a wide pleat made of two knife pleats each facing opposite to the other. These are quite often used in uniforms.

Bound and faced placket: This is used in the left seam of skirts or petticoats and back seam of dresses. As it uses two pieces of fabric to finish the placket. It is also called as two-piece placket.

Buttons with holes: These are commonly used buttons which are sewn flat through the holes from upper side of the fabric. These are available with two or four holes. They are made of bone, glass, metal, plastic.

Buttonholes: These are finished vertically or horizontally. These are slits cut in garments to hold buttons in place. They are made on the overlap section of the garment opening in line with the buttons on the under lap.

Buttonhole scissors: These can be adjusted so as to cut button holes in any size required. They are useful if one needs to make many button holes.

Button loops: Instead of buttonholes, loop may be used to fasten buttons. These may be made of thread or cloth.

Clip: A short cut made with the point of the scissors into the seam allowance.

Clutch or Thumb screw: This is in the centre of the fly wheel and it engages and disengages the stitching mechanism of sewing machine.

Conspicuous seams: The seams that have stitches seen on the right side of the garment like flat fell seam, lapped seam etc. These are also used for decorative purposes.

Conspicuous plackets: Tailored plackets seen on the outside of the garment are conspicuous plackets commonly seen on men's shirt sleeve, on neck openings of kurta's, children's dresses.

Continuous bound placket: It is also called as one-piece placket. In this single strip of material is used to finish the entire length of the placket opening.

Cross tucks: When rows of tucks are stitched along the fabric in both horizontal and vertical directions, the decoration is called cross tucking.

Dart: A fold of fabric stitched at a specified width and tapering to nothing at one or both ends, shaping the fabric to a curved surface.

Diagonal basting: This hand stitch is used when several layers of fabrics are to be held securely. A diagonal or slating stitch is made on the upper side and a small vertical stitch on the underside. The stitches are made about 1/4 inch apart.

Double stitch finish: This is a seam finish done for a plain unfinished seam or pinked seam and is not suitable for bulky fabrics.

Drafting: Drafting is the system of drawing patterns on paper with mechanical precision using body measurements. This is an effective and economical method of making patterns which can be learned easily.

Draping: It is a method of developing patterns using a model, needs lot of fabric and considerable skill.

Dress form: A padded form of body either made of card board, plastic, plaster of Paris, useful during designing by draping and to check the fit of the finished garment.

Dress maker's Tracing Paper: A special type of carbon paper designed for marking on cloth.

Edge stitched finish: The seam finish is stitched by turning under 1/4 inch on each seam edge and top stitching close to the fold without catching the garment. This is a bulky finish and is not suitable for deeply curved seams.

Even basting: This is used for tracking seams and other details. It is a short temporary stitch used on smooth fabric and in areas that require close control such as curved seams.

Eyes: Eyes are small fasteners always paired with hooks worked as inconspicuous fasteners.

Fasteners: These are used to close the placket when the garment is put on. There are various types of fasteners some are decorative and conspicuous while some are meant to be inconspicuous. They include hooks, eyes, buttons, button loops, and snaps.

Fabric loops: This type of fastening adds a decorative trim to children's and women's garments. These are made of strips of bias fabric tubes. Buttons matching to the fabrics loops are fixed on the under lap.

Facing: It is a method of finishing, to the raw edges in a garment especially necklines armholes, collars.

Fancy buttons: These are buttons generally used for decorative purpose. They are mainly false buttons which are used for not closing the placket. They are worked on the right side of the garment.

Feed Dog: This consists of a set of teeth fitted below the needle plate of sewing machine. It helps to move the cloth forward while sewing.

Fitted facing: Shaped facing is cut to the exact shape of the garment edge, to which it is to be applied. Usually it is cut on the same grain as the section of the garment.

Flat fell seam: A conspicuous seam mostly used on men's sports shirts, work clothes and children's clothes and pyjamas where strength of the seam is more important factor.

Flat pattern method: The basic pattern which is developed on paper may be modified to develop patterns for varied styles. This is also called as flat pattern designing.

French binding: French binding or double bias binding is used on sheer fabrics. Folded strips of bias are used to finish the necklines giving the name double bias binding.

Frills: These are used to create fullness by adding decoration to a garment. Also used at the hems of skirts and dresses to add length.

Fullness: Shaping of the garment for good fit and ease is done by one of the method called fullness. Fullness of material is an important feature of the style. There are various ways of introducing fullness.

Gathers: Gathers are graceful folds of fabric that provides fullness, suggesting a soft look, which can be made using machine or hand stitches. Gathering is an effective and decorative way of disturbing fullness over a given area.

Godet: These are wedge shaped pieces which are usually set into a skirt so that the wide side of the wedge becomes a part of the hem of the skirt.

Grain: Holding the fabric in its lengthwise direction is said to be in the grain. When the lengthwise yarns fall exactly perpendicular to the crosswise yarns in a fabric then it is called as true grain.

Hemming: This is hand stitch, used to secure down a folded edge of material like hems. Hemming appears as small slanting stitches on the right and wrong sides of garment.

Hem marker: It is used to mark out a completely level hem line in chalk. It can be adjusted to any hem length. This is commonly used by professional for hem marking.

Hem gauge: It is a 6-inch gauge can be made of cardboard or brought from shop. It is used as a measuring guide for marking width of the hems, pleats and seam allowances accurately.

Hooks: Hooks are small but comparatively strong fasteners, worked on the overlap side of the placket paired with eyes on the under lap of the placket.

Inconspicuous seams: These seams when finished will not have stitches seen on the right side of the garment. Examples are plain, corded and French seams.

Inconspicuous plackets: Inconspicuous plackets are not seen when the garment is put on. The continuous bound placket, bound and faced plackets are examples of inconspicuous plackets.

Interfacing: A third thickness of carefully selected fabric which is placed between the garment and facing fabrics for added body, shaping and support.

Interlining: A fabric placed between the lining and the outer fabric. It is used in coats, jackets to add warmth or bulk in bedspreads.

Inverted pleat: It is made up of two knife pleats facing away from each other.

Knot hemming: It is a hand stitched seam finish, worked from right to left, each stitch is fixed securely by means of a knot and therefore, it is very strong.

Knife pleat: These are narrow pleats facing in one direction about 1/2 to 1 inch wide.

Kurtha placket: This is a simple neck finish used to infants or children's clothes and kurta's. This is also called as tailored placket.

L-Scale: It has arms or sides made of metal giving a L-Shape; the long arm measures 24 inches, a short arm 14 inches. This has a perfect right angle corner and is used to draw lines at right angles at the time of drafting.

Lapped seam: A seam mostly used to attach the gathered piece to the main garment or for making zippers.

Link button: Sleeve cuffs and jackets with centre lines that just meet are frequently held together with buttons sewn to from links are called link buttons.

Layout: The position in which pattern pieces are laid on the fabric for cutting.

Measuring tape: It has a smooth surface that is clearly marked with increments of inches and centimeters on both sides. It is usually about 1/2 inch to 1/4-inch-wide and 60 inches long and has 1/8 divisions.

Needle bar: This is a steel rod that holds the needle at one end with the help of a clamp of the sewing machine. Its main function is to give the needle, the motion.

Needle case: It is a round case with assorted sizes of hand and machine needles.

Needle threader: It is a device made of thin wire which aids in threading machine needles and hand needles.

Neckline: It is an outline of bodice around the neck. These necklines can be finished either by using facing or binding or by attaching a collar.

Over handing: These hand stitches are used to secure two finished or folded edges together or for applying lace or patch. They produce straight stitch over the garment pieces.

Patterns: Pattern of a garment is the blue print based on which the basis of the fabric is cut.

Paper patterns: These are made and are available in two types - commercial patterns prepared on the basis of standard measurements and patterns drafted using personal measurements.

Pin basting: It is an easy and quick method of basting or tacking with the help of pins.

Pinking: A pinking shears used to trim the edges of fabrics that are firmly woven and do not ravel is called pinking.

Pinking shears: They are 9 to 10 inches long shears with serrated blades. They create a ravel resistant zigzag finish to raw edges to woven fabric seam allowance.

Pin cushion: A small stuffed cushion made of wool or felt, filled with wool or hair to hold the pins while working near the table.

Pin tuck: Pin tucks are very tiny that may be done by hand with tiny running stitches or by machine. They are mostly used on baby's clothes or fine blouses. They are done on single layer of the fabric in one direction.

Plain seam: This is the most widely used seam which is flat, pliable, less bulky and inconspicuous. It can be used on all types of fabrics except on very transparent kinds.

Placket: Plackets are the finished openings made in the garment to put on or take off the garment easily.

Pleat: Pleats are formed by folding the fabric that provides fullness in some parts of a garment. They can be placed single or in a series and can be pressed flat or left un-pressed, according to the style of the garment. Pressed pleats give a smooth, slimming line to a garment, whereas unpressed pleats provide a softer and fuller shape.

Preshrink: To relax or contract fabric before cutting, so the size of the garment will not be altered after laundering or dry cleaning.

Presser foot: It is fixed to the presser bar of the sewing machine to hold the cloth firmly in position when lowered.

Presser foot lifter: A lever attached to the presser bar of the sewing machine for raising and lowering the presser foot.

Running stitch: This is the simplest form of hand stitch, used for permanent sewing. Hand seams such as tucks, gathering, shirring, quilting and mending can be done with these stitches. It is similar to even basting, but the stitches are much smaller.

Run and fell seam: This type of seam is mostly used on men's sports shirts, work clothes and children's clothes and pyjamas for its durability.

Run and back or combination stitch: In this a backstitch and three or four running stitch are combined and can be used for working plain seams done by hand. This stitch is faster than the backstitch and stronger than the running stitch.

Ruffles: These are used for the purpose of adding decoration to a garment. Sometimes they are used at the hems of skirts and dresses to add length.

Scissors: They are 5 to 6 inches long cutting tool, used for light cutting, trimming, clipping corners and cutting curves. These have round handles for both the blades.

Sewing machine: A machine which forms the stitches by forming the loops between the top and bottom threads feeding into the machine. Machines range from most basic having only simple lock stitch to the electronic machines that use advanced computer technology.

Seam: A seam is a method of joining two or more pieces of materials together by a row of stitches. They give definite shape and appearance to the garment. Permanent stitches are used in making seams.

Seam allowance: It is the extra amount of material provided over and above to the exact drafting to enable working of seams.

Seam finishes: These are made to prevent fraying of the raw edges and thus make the seams more durable. They also provide a neat appearance to the inside of the garment.

Seam ripper: This is useful for ripping out machine stitches. It has a handle and a bent point, which can be inserted into the stitches and pulled to break them.

Shears: They are 8 to 10 inches long scissors, used for cutting all types of fabrics. Shears differ from scissors in that they have one small ring handle for the thumb and a large ring handle for the second, third and fourth fingers.

Shirring: Shirring is a decorative effect achieved by five or more rows of gathering stitches.

Shank button: These are buttons attached to the garment from the underside with a small loop on their lower side.

Single bias binding: Bias binding done using single layer of bias strip is called as single bias binding.

Slip basting: It is a finish for hems, facings or folds where invisibility is more important than strength.

Sloper: The basic pattern which is developed on paper may be referred as sloper or block, master or foundation pattern.

Sleeve board: This is a well-padded miniature of a full-sized ironing board, is used to press sleeves and hard-to-reach small details. It has a tapered end on one side and a round end on the other side.

Snaps: Snaps or press buttons are a kind of small fasteners having less holding power. Each snap has two parts - a ball or knob and a socket.

Spool pin: It is fitted on the top of the arm to hold the reel on the sewing machine.

Steam iron: It is an iron with adjustable temperature control and is equipped with a thumb press for automatic steam release. Distilled water is heated, and the resulting steam can be released with the thumb press while pressing.

Stay Stitching: Stitching is a row of long stitches done at a distance of 0.5 cms from the edge of the neckline to retain the neckline shape is called as stay stitching.

Stitch regulator: This controls the length of the stitch formed by sewing machine. Some regulators can stitch in reverse.

Take up lever: It is a lever fitted to the body of the arm of the sewing machine with a small hole through which the thread passes. It's up and down motion feeds the thread to the needle and tightens the loop formed by the shuttle and loosening the top thread to complete the stitch.

Tacking: Holding two or more layers of garment pieces or material together by hand stitches is called as tacking.
Temporary stitches: The hand stitches help in holding two or more layers of material together before the permanent stitches are made in garment parts. These temporary stitches are termed as tacking or basting stitches.

Tension disc: It comprises of the two concave discs put together with the convex sides facing each other on the back side of the sewing machine. The thread passes between the two discs. The tension of the thread is adjusted by a spring and nut which increases or decreases pressure.

Thimble: A metal case fitting snugly on the middle finger of the needle holding hand is a thimble. These are necessary for efficient and accurate hand sewing. They are two types of thimbles: an open-ended thimble, preferred by tailors, and the more common closed-ended thimble, called the dressmakers thimble.

Thread guide: It is a small hole made of spring wire through which thread runs directly to needle on the sewing machine.

Thread Loops: The thread loop is an inconspicuous fastening which is most often found at the neck edge of collars.

Top stitch: Stitching on the upper side to the garment piece, to hold the fabric in shape, generally used at plackets, pleats, necklines etc.

Tracing wheel: This is a sharp toothed wheel used with dress maker's carbon to transfer pattern markings to cloth. Serrated edge and smooth edge tracing wheels are available in the market.

Trimming: Clipping of extra allowances near the curved seam to get the neat finish of the seam is called as trimming.

Tuck: A tuck is a fold of fabric stitched in place by running stitch or machine stitch on the right side of the garment as a means of shaping the garment to the body for holding in fullness or adds decorative effect at shoulders, waistlines, yokes, pockets or cuff sleeves etc.

Uneven basting: A hand basting stitch with longer upper stitch than the lower side. The size of the stitch is usually 1/2 inch, used as guideline where there is little or no strain.

Whipping: This is a hand stitch, used to secure two finished or folded edges together. Sometimes it is used to finish edges of handkerchiefs. Whipping stitch produces slanting stitches.

Yard stick: It is a measuring scale made of wood/plastic, generally of 36” to 45” long. It is used for checking grain.

Bibliography

Practical Clothing Construction - Part I & II, Mary Mathews, Jevee printers, Chennai.

Clothing Construction and Wardrobe Planning, Lewis Bower and Kincher, Macmillan Book Company, New York.

Home Science Garment Construction, (CGD&M), IVC First Year, Lab Mrs. R. Manjula Vani, Prof. J. Pratap Reddy, Dr. A. Pandaiah, Sri S. Bhoopal Reddy, Manual, Board of Institute of Education, Govt. of Andhra Pradesh, Hyderabad.

Basic Clothing Construction (CGD&M) IVC First Year, Mrs. Nageshwari Bhaskar, Mrs. M. Ragamanjari, Edited by Mrs. R. Manjula Vani, State Institute of Vocational Education, Directorate of Intermediate Education, Govt. of Andhra Pradesh, Hyderabad.

Apparel for Children (CGD&M) IVC First Year, Mrs. R. Manjula Vani, Mrs. S. K. Mymoon, Ms. P. Geetha, State Institute of Vocational Education, Directorate of Intermediate Education, Andhra Pradesh, Hyderabad.

Text Book of Home Science, Prem Latha Mullic Publishers.

Text Book of Clothing & Textiles, Sushma Guptha, Neeru garg, Renu Saini, Kalyani Publishers, New Delhi.

Hand Book of Fashion Designing-Best Drafting Technique, Ritu Jindal, Mittal Publications, Mumbai.

COMMERCIAL GARMENT TECHNOLOGY

Paper - II

TEXTILE SCIENCE

INDEX

Unit 1

CLASSIFICATION AND GENERAL PROPERTIES OF TEXTILE FIBRES

Structure:

1.1Introduction

1.2 Classification of Textile fibres

1.3General properties of Textile fibres

1.4 Differences between Vegetable and Synthetic fibres

Learning Objectives:

After studying this unit, the student will be able to know and understand

- The classification of textile fibres
- The general properties of textile fibres

Unit Preview:

The basic knowledge of textile terms is important to understand textiles. This unit deals with classification of textile fibres and general properties of textile fibres.

1.1 Introduction:

There are five basic needs for any human being. Food, Air, Water, Shelter and Clothing. So, clothing is one of the basic needs of human being. The word textile is derived from the Latin word "Texture" for Woven fabrics. Clothing is made comfortable and attractive by use of textiles. The study of textiles will help to a great extent when we purchase textile materials. The knowledge of textiles will prevent us from making mistakes and we will be able to purchase good quality materials.

There is evergreen demand for textiles and clothing by people of all income groups throughout their lives.

Yarns are produced by twisting and spinning of textile fibres and the fabric is produced by interlacing or interlocking of the yarns. These yarns are used for weaving or knitting a fabric. There are two general classes of yarns. Spun yarns which are made from staple fibres and filament yarns which are made from filament fibres. So, it is necessary to know or to define the terms textile fibre, yarns and fabric.

A "Fibre" is defined as any product capable of being woven or otherwise made into fabric. According to length, fibres are two types. Fibres which are measured in inches are called staple fibres and the length of staple fibres which are measured in meters or yards and in case of manufactured fibres in kilometers or miles are called filament fibres. Silk is the only natural and strongest filament fibre. Therefore, short staple fibres are of short length and filament fibres are long fibres.

Fabric is the product of various processes like weaving, knitting, and braiding. Fabrics made out of different fibres are available in the market. Fabrics are made of natural and manmade fibres.

1.2Classification of Textile Fibres:

The fibres which are obtained from natural sources are natural fibres. Fibres which are made artificially by using chemicals known as manmade fibres. According to the source, Fibres are broadly classified into two ways.

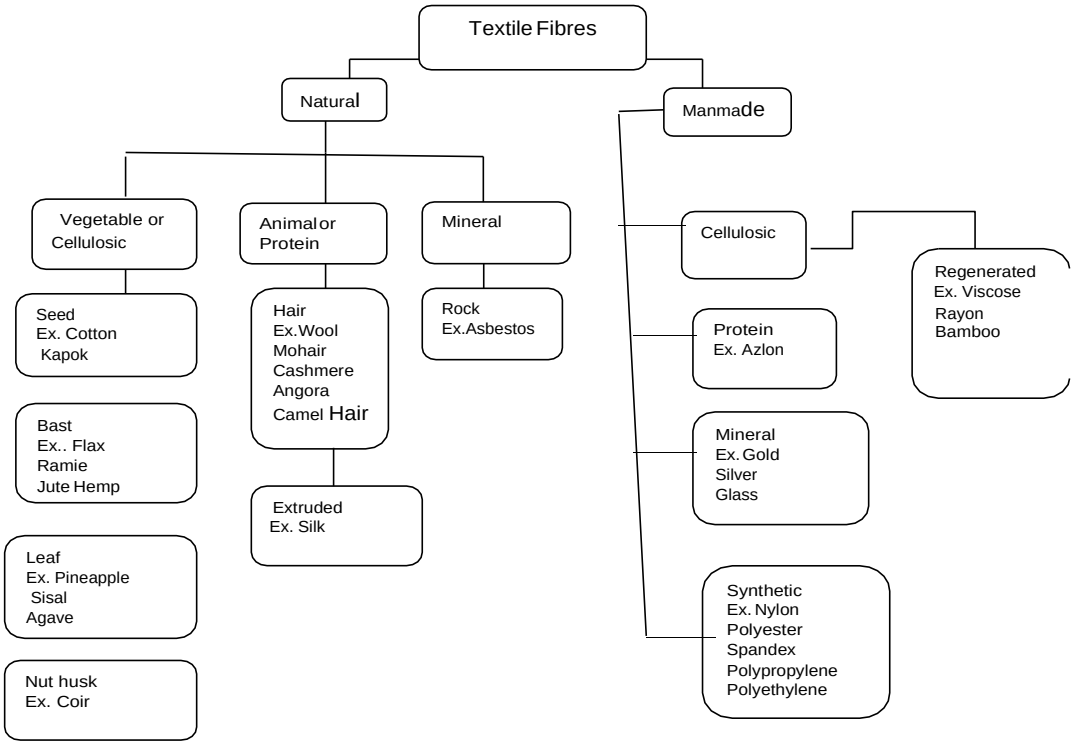


Fig : 1.1 Classification of Textile Fibres

Vegetable fibres or cellulosic fibres:

The fibres that are derived from vegetable or plants are called vegetable fibres. Their chief constituent is cellulosic matter. They are further divided as seed fibre, bast fibre (taken from the stalk of the plant), leaf fibre and nut husk fibre. Cellulose is made up of elements like carbon, hydrogen and oxygen. The cellulose fibres have certain common properties like low resilience, high density and good conductor of heat.

Animal fibres or protein fibres:

The fibres which are obtained from animals are called animal fibres. Wool and silk are common examples of animal fibres. Wool is obtained from sheep. It is a hair fibre grown on the sheep. Silk is called as extruded fibre or secretion fibre obtained from the secretions of silk worm which form into fibre upon solidification. Silk is the only natural fibre available in the filament form. They are made up of protein molecules. The basic elements in the protein

molecules are carbon, hydrogen, oxygen and nitrogen. Animal fibres have high resiliency but weak when wet, they are bad conductors of heat.

Mineral fibres:

Mineral fibres are inorganic materials shaped into fibres and are mainly used in fire proof fabrics. Asbestos is an example for mineral fibre. Mineral fibres are fire proof and resistant to acids and are used for industrial purposes.

Manmade fibres:

The fibres that are not naturally present in nature but are synthesized.

Cellulosic source:

Fibres are manufactured from natural cellulose, which is obtained from wood. Regenerated fibres-manufacturing fibres from naturally occurring material which is not in fibre form.

Protein fibres:

Fibres are developed by man from different protein sources such as maize corn, soya bean.

Mineral fibres:

These fibres are glass, steel and carbon all of which are found in industrial end uses. Glass is mostly used in low cost reinforcement, plastic for ships, cars, thermal and electrical insulation etc.

Synthetic fibres:

The term synthetic means that the long filament fibres are entirely made from petro chemicals. The properties and application of these fibres are based on the chemical composition and arrangement of molecules in the fibres.

1.3 General properties of Textile fibres:

1. **Staple fibres**: Natural or manmade or short length fibres which measure in inches or centimetres. Their length ranges from $3/4^{th}$ inch to 18 inches.

2. **Filament**: Filaments are natural or manmade fibres of continuous length measured in yards or metres. Natural silk filament is 360-1200 metres. Synthetic filament yarns are made kilometres long.
3. **Texture**: The visual or tactile sensation experienced when hand is passed over a surface. It also means appearance of the fabric.
4. **Resilience**: Resiliency means that the fibre can be compressed or crushed and on release of pressure, will tend to return to its original shape. This quality causes the fabric to be wrinkle resistant.
5. **Lustre**: Lustre is produced by the reflection of light from a smooth surface. A lustrous effect in fabric adds to its attractiveness. Mercerising process is a chemical method of producing lustre.
6. **Heat conductivity**: The ability of fibre to conduct heat has great significance in textile. The degree of heat conductivity determines whether the fabrics are suitable for winter or summer use.
7. **Crimp**: It is the waviness of a fibre. It is the measure of difference between lengths of the un-straightened fibres under specific tension. It is classified into high, low and normal.
8. **Elasticity**: It is the ability of a stretch material to return immediately to its original size after deformation. Fibres which have good elasticity give comfort in clothing. The greater the elastic quality the more the fibre will resist tearing.
9. **Abrasion resistance**: The ability of a fibre to resist wearing away by friction or rubbing is referred to abrasion resistance.
10. **Tensile strength**: Tensile strength is a prime necessity in fibres. The ability of fabric to withstand the strain of wear or resistance to tearing when subjected to tension.
11. **Affinity for dyes**: The readiness with which a fibre absorbs and retains dye. Affinity for dye is usually determined by porosity of a fibre.

12. **Absorbency**: The quickness with which a fabric absorbs moisture and gives it up again in evaporation. Absorbency may be increased by fabric construction or by finishing process.

1.4 Differences between Vegetableand synthetic fibres:

Vegetable fibres	Synthetic fibres
1. All the natural fibres come from nature	1. Synthetic fibres are completely manmade
2. Fibres are found in staple or filament form	2.It is found in filament form, but sometimes it could be converted into staple or cut length
3.No need of spinneret for spinning process	3. Spinneret is essential for spinning process
4.Natural fabric is comfortable to wear	4.Synthetic textile fibre is not as comfortable as natural fibre
5. It contains natural crimp	5. Crimp is applied on filament after passing through spinneret
6.These are less durable than synthetic fibres	6. Synthetic fibres are more durable than natural fibres
7.It grows with its natural colour	7. Colours are added in the solution bath as required
8.Dust and impurities could be found in natural fibre	8. No dust or impurities found in synthetic fibres
9.Length of fibre is natural	9.Length of the fibre is controlled by man
10.Price of natural fibre is higher than synthetic fibres	10. Prices are less when compared to natural fibres

Summary:

Textiles are those materials which are used for covering the body,provide warmth and to express one's own wealth or stature. Textiles are made from fibres, which are basic component of yarns. Fabrics are made from different fibres available in the nature, classification and general properties of textile fibres are discussed in this chapter.

Short Answer type Questions:

1. Define fibre
2. What are the examples of vegetable fibres?
3. What are animal fibres?
4. What are mineral fibres?
5. What are manmade fibres?
6. What is a filament?
7. What is staple fibre?
8. What is resiliency meant by?
9. Define lustre and static electricity
10. Define crimp
11. What are regenerated fibres?
12. Write any two general properties of textile fibres.

Long Answer type Questions:

1. Classify textile fibres.
2. What are the general properties of textile fibres?
3. Write about the differences between cellulose and synthetic fibres

Unit 2

MANUFACTURE AND PROPERTIES OF CELLULOSIC FIBRES-COTTON

Structure:

Introduction
Manufacture of handmade cotton
2.3Manufacture of machine made cotton
2.4Types of cotton
2.5By products of cotton
2.6Properties of cellulosic fibre-cotton
2.7Uses of cotton
Fibre blends
Consumer demand for cotton

Learning objectives:

After studying this unit, the student will be able to

- To understand the importance of history of cotton andcotton growing conditions
- To learn about cotton manufacturing process
- Identify the microscopic structure of cotton fibre and its properties
- To get familiar with various types of cotton
- Understand about cotton blends
- Know the consumer demand for cotton
- Understand the major end uses of cotton

Introduction:

Cotton is obtained from a plant. Cotton is classified as natural cellulosic, seed fibre of staple length. It is made up of cellulose. As cotton occupies 50% of consumption of fibres by weight in the world. It is called as the "King of all fibres". It is a commercial crop and it plays a vital role in countries of economic growth which provides good employment. A huge amount is also earned from exports of cotton fibre. Cotton plant grown in the tropics needs a climate with 6

months of summer weather to blossom and produce pods. It is the shortest of all textile fibres. Its length varies from 8/10 of an inch to 2 inches.

It requires 200 days of continuous warm weather with adequate moisture and sunlight. Frost is harmful to the plant. America produces more than 40% of the world's cotton. India ranks second to the United States as a producer and exporter of cotton.

The suitable months for plantation are March and April. When the pods mature they burst open with the white fluffy cotton,in the pods. The fully opened cotton pods are shown in fig. 2.1

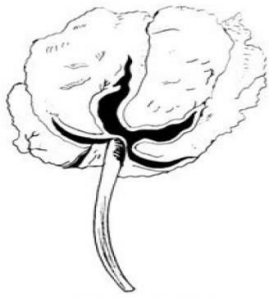


Fig. 2.1 Cotton Boll

Cotton is picked either by hand or by machine the process is called picking. Cotton balls are processed in a cotton gin that remove the seeds and pods from the cotton fibres. The gin cleans and dries the raw cotton and passing the cotton over a series of fine combs. It is then packed into bales.

Manufacture of handmade cotton:

The tools and appliances used by the cotton weavers consists of spinning wheel(charka) spindle (takli) and a bow shaped beater(dhun). The threads then formed are wound on a bamboo reel and from which warp of the hand loom is set to weave the fabric. After weaving the cloth is calendared with a blunt beater to give it a gloss and to soften it. The cloth is stamped, ticketed and made ready for sale.

Manufacture of machine-made cotton

Gathering of Cotton pods
↓
Ginning (Removal of seeds)
↓
Lap formation
↓
Carding
↓
Combing
↓
Drawing
↓
Roving
↓
Spinning
↓
Weaving andDyeing
↓
Finishing

Gathering of cotton pods:

The bales are opened and cotton from different bales is mixed and blended to get even quality yarn.

Ginning:

The fibres are removed from the seed, leaf fragments, dirt and other materials. The seeds are removed by the cotton gin. This process is ginning.

Forming the laps: In this step, dirt in cotton is removed and fibres are made intoa soft roll or lap. Then several laps are combined into one.

Carding: The fibres are drawn together to form a loose rope called sliver.

Doubling: Slivers are combined here for uniformity.

Combing: It is continuous and refinement of the carding process. Fibers are free from woody stalk of the plant. They are used for finer quality fabrics.

Drawing: Slivers are combined and smoothened and stretched with these rollers which runat different speeds. The slivers are given first twist here and are wound onto bobbins.

Roving: The bobbins are placed on the roving frame where further drawing and twisting takes place, until the cotton stock is about a pencil lead in diameter.

Spinning: Done on the spinning frame where the stock passes through sets of high-speed rollers and gives the yarn of the desired thickness.

Weaving and dyeing: Any variety of weaves can be used for cotton. Dyes are applied to raw cotton at fibre, yarn or fabric stage.

Finishing: Both performance finishes and functional finishes are given to cotton.

Types of cotton:

Different kinds and types of cotton are grown in various parts of the world. The quality of cotton is based on its colour, length, fineness and strength.

Upland cotton: It consists of about 99% of the United States cotton crop.

American pima: It is used mostly for sewing thread, although a small amount is used in high quality broad cloth and other fabrics where silky, smoothness, softness and lustre are desired.

Egyptian: The fibres are light brown fine and strong

Asiatic: These coarse fibres less than 1 inch in length. It is mostly used for surgical supplies.

By products of cotton:

Cotton linters:

Cotton linters are the short fuzzy fibres that remain on the seeds after they have been separated from the fibre in the cotton gin. They are used in manufacturing of rayon and acetates, plastics, photographic film.

Hulls:

These are outside portion of the cotton seeds rich in nitrogen and used as fertilisers, paper, cattle feed.

Inner seed:

It yields cotton seed oil which is used as cooking oil and in the manufacturing of soap.

Properties of cotton: **Microscopic appearance of cotton**:

The microscopic structure of the cotton fibre looks like a hoisted ribbon or a collapsed and twisted tube. The twisted or convolution identify the cotton fibre under the microscope. The cotton fibre is a single plant cell. Its cross section is oval. It consists of cuticle, primary and secondary walls and a lumen.

Fig. 2.2 Cross Section

Fig. 2.3 Cotton Fibre under the microscope

Fig.2.2 In longitudinal view cotton fibre has a flat twisted ribbon like appearance.

Burning test:

When cotton fibre approaches the flame scorches ignites readily, when in flame burns quickly, after removing from the flames continues to burn, has afterglow. It smells like burning paper. Its ash is very little, soft grey in colour.

Physical properties:

a. **Composition**:

Cotton fibres are mainly made of cellulose which constitutes 88-90% water is to 8 % and other natural impurities.

b. **Strength**:

Cotton fibres are quite strong as compared to other fibres. This strength increases when wet upto 25% than when it is dry.

c. **Resiliency**:

Cotton fibres have low resiliency and hence wrinkle easilyunless finishing is done.

d. **Hygroscopic nature**:

Cotton does not hold moisture as goodas wool and silk do, but it absorbs and feels damp much more quickly. It absorbs perspiration and gives feeling of coolness.

e. **Electrical property**:

The hygroscopic nature ordinarily prevents cotton textile materials from developing static electricity

Thermal properties:

a. **Effect of light**:

Exposure to light tends to weaken the fabric colour and strength

b. **Effect of heat**:

Cotton fibres burns readily and ignite easily giving smoke and ash like a burnt paper

c. **Cleanliness and Washability**:
Though cotton absorbs dust due to its rough nature. It can be washed easily in hot water and strong soaps without damaging the fibre.

d. **Lustre**: Cotton fibre has no lustre and elasticity

Chemical properties:

a. **Action of acids**: Strong acids destroy the fibres rapidly, dilute acids have little or no effect on cotton but if allowed to remain in contact for longer periods due to evaporation of water, the acid becomes concentrated and weakens the fibre.

b. **Action of alkalies**: Cotton is not affected by alkalies but prolonged exposure may affect the colour of the fabric.

c. **Effect of bleaching agents**: All bleaching agents can be safely used on white cotton fabrics but dyed cotton needs special care.

d. **Affinity for dyes**: Cotton can be dyed with almost all classes of dyes. Thus, cotton has good affinity for dyes.

e. **Effect of moths and mildews**: Cotton is resistant to attack by moths but if dampened it will be readily attacked and destroyed by mildews and silver fish.

f. **Effect of perspiration**: Both acidic and alkaline perspiration discolours the fibre.

Uses of cotton:

Cotton is the most versatile and most widely used fibre. It is highly absorbent. comfortable and mostly used during summer season. Cotton can withstand heat and high temperature and therefore can be boiled while washing. Hence it is useful for children's clothing and hospital clothing. Cotton blends well with other fibres and blend of cotton and polyester, cotton and silk, cotton and viscose are widely used as dress materials. Due to its dyeing affinity it can

be dyed and printed in a wide variety of shades. Cotton is cheaper and can be called as poor man's fabric. Cotton fibres can be used to prepare different weights of fabrics. For example, muslin in light weight fabric, poplin in medium weight fabric, jeans as heavy weight fabric. Such fabrics are put to different uses. Thus, cotton is the most versatile and hygienic fibre.

Finishes of cotton:

Cotton fabrics can be finished for anti-bacterial, mildew resistant and flame-resistant treatments. Regular finishes like singeing, mercerization, sizing, calendaring and special finishes like crease resistant, anti-bacterial finishes, mildew and rot treatment, moth repellent treatments are common.

Dyeing and printing: Cotton fabrics have affinity for azoic, direct, reactive, sulphur and vat dyes.

Cotton and blends:

Cotton is blended with many fibres like cotton and wool, cotton and linen, cotton and silk, cotton and viscose rayon, cotton and nylon and cotton and polyester.

Reasons for blending are:

- To facilitate processing
- To improve properties like dimensional stability
- To produce better performance
- To improve texture, hand or feel and appearance of fabrics
- To produce multi coloured version or multi-colour fabrics
- To reduce cost

Consumer demand for cotton:

a) **Versatility**: Cotton fibre can be spun alone or it can be blended with other textile fibres such as linen, wool, silk, viscose rayon, polyester, nylon. It serves the purpose of clothing or apparel, home furnishing and industrial fabrics by giving comfort, durability, fashion and ease for care.

b) **Durability**: Due to natural twist cotton spins well that it can be twisted very tightly. Tightly twisted yarns produce durable fabrics.

c) **Comfort**: Cotton conducts heat away from the body and allows the cooler temperature outside to reach the body. So, it is a cool material for summer or tropical wear. Knitted cotton is used as comfortable wear.

d) **Fashion rightness**: Fashion designers of various countries have considered cotton as glamorous and include in their collections.

e) **Ease of care**: The factors of light, laundering, ironing and perspiration are common considerations in assessing the colour fastness of cotton.

f) **Economy of price**: Cotton materials are flexible to fit into all types of economic groups. By products of cotton are used for many purposes.

Major end uses:

Cotton is the most versatile and most widely used fibre. This is highly absorbent, comfortable and mostly used during summer season. Cotton can withstand heat and high temperature and therefore can be boiled while washing. Hence it is useful for children's and hospital clothing.

Cotton towels are most common as they are high in absorbencyavailable in wide range of colours, with washability and durability. Sheets and pillow cases are mostly blends of cotton with polyester or made of pure cotton. Drapes, curtains and upholstery fabrics are made of cotton and its blends.

Industrial uses include book bindings, luggage and hand bags, shoes, slippers, tobacco cloth, woven wiping cloths and wall covering fabrics.

Wide range of wearing apparels:

Due to its dyeing affinity it can be dyed and printed in a wide variety of shades. Cotton is cheaper and can be called as poor man's fabric. Cotton is also used for blouses, shirts, dresses, children's wear, active wear, swim wear, suits, jackets, skirts, pants, sweaters, hosiery, bed spreads, comforters, sheets, towels, table cloths, table mats and napkins.

Summary:

Cotton continues to be the world's major textile fibre in spite of the advent of many synthetics. It is the oldest and most versatile of all fibres.The main reason for use of cotton is its good weaving qualities, low cost, high absorption, excellent abrasion, stability to repeated washing. It can be safely ironed even at high temperature. It has excellent wash and wear and wrinkle resistance and also good if resin treated.

Short Answer type questions:

1. What is a staple?
2. Give the steps for recent advances in handmade sector of cotton
3. What are the by-products of cotton?
4. What are physical properties of cotton?
5. Mention the uses of cotton.
6. What are the reasons for blending cotton with other fibres?
7. Draw the microscopic structure of cotton fibre.
8. State the finishes given to cotton.
9. State the reaction of cotton fibre towards burning test.

Long Answer type questions:

1. What are the chemical properties of cotton?
2. What are the steps involved in preparation of machine made cotton?
3. Describe the characteristics of cotton.
4. Write the consumer demand for cotton.
5. Explain the physical properties of cotton.

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Unit3

MANUFACTURE ANDPROPERTIES OF PROTEIN FIBRES: SILK, WOOL

Structure:

Learning objectives:

After studying this unit, the student will be able to

- Understand the history of silk
- Procedure for silk production (silk fibre)
- Physical and chemical properties of silk
- History & classification of wool
- Manufacturing process of wool
- Physical and chemical properties of wool

Introduction:

Silk is considered as "Queen of all textile fibres" as it has beauty and elegance and good performance properties. Silk is a natural protein fibre obtained from silk cocoons. Japan is known for producing best variety of silk. India is the world's second largest producer of silk with different types of silk in the market. The cultivation practices called sericulture, deals with rearing of silk

worms. There is tremendous silk production in recent years. To obtain quality and quantity of silk, rearing conditions have to be controlled carefully throughout the life cycle of silk moth.

There are two types of silk, mulberry or cultivated silk and wild silk. Cultivated silk is creamy white or yellowish white in colour, wild silk colour ranges from brownish to golden yellow in colour.

History of silk:

Silk is known as "Queen of fibres" as it has maintained a position of great prestige and considered as a luxury fibre throughout the development of history. In India it is considered as a symbol of royalty and prestige, a 'pure fabric' used for all religious rituals and ceremonial occasions. Silk was first discovered in china 2600 B.C when fourteen years oldwife of Chinese emperor Huang-Ti discovered the secret of drawing of filament from cocoon of the silk worm and producing fabric from the filament. This young princess,Si-ling-chi is known as 'goddess of silk'. It was maintained as secret for thousands of years. After thousands of years, the secret was stolen outfromChina. From then onwards silk became the pure prized fibre and availablein most countries.

Types of silk:

The silk fabric is classified into two categories

1. Mulberry silk or cultivated silk e.g. Bombyx mori
2. Non-mulberry or wild silk e.g.: Tussar silk, Munga silk and Eri silk

Life history of silk moth:

The female silk moth lays eggs from which larvae hatch which are called caterpillars or silkworms. They grow in size and when caterpillar is ready to enter the next stage of its life cycle called pupa, it first weaves a nest to hold

itself. Then it swings its head from side to side in the form of the figure eight(8). During these movements of the head, the caterpillar secretes fibre made of a protein, fibroin which harden on exposure to air and becomes silk fibre. Soon the caterpillar covers itself by silk fibres and turns into pupa. This covering is known as cocoon. The further development of pupa into moth continues inside the cocoon. Silk fibres are used for weaving silk cloth. Silk yarn is obtained from the cocoon of the silk moth. The silk yarn yield is different in texture, coarse, smooth and shiny, depending on the feed.

Fig. 3.1Silk moth and eggs

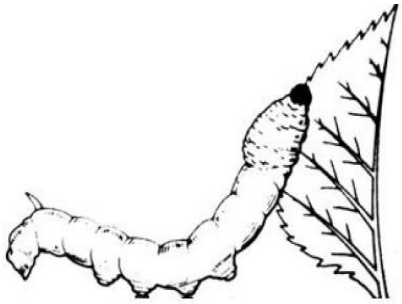


Fig. 3.2 Larva of Italian Bombyx mori silkworm moth

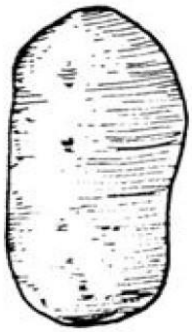


Fig. 3.3 Cocoon of Bombyx mori

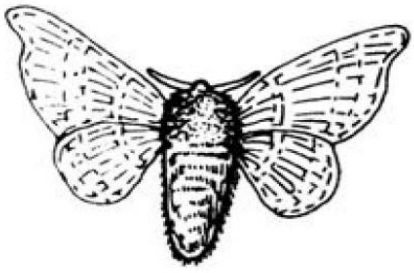


Fig. 3.4 Male Bombyx mori or mul-berry-feeding silk worm moth

Fig: 3.1Life cycle of silk moth

Processing of silk fibre From cocoon to silk:

For obtaining silk, moths are reared and their cocoons are collected to get silk threads.

Rearing silk worms:

A female silk moth lays more than 350 eggs at a time. The eggs are stored carefully on strips of cloth or paper and sold to farmers.

The farmers keep eggs under hygienic conditions and suitable conditions of temperature and humidity.

The eggs hatch after 2 weeks and develop into larva or caterpillar. The larva called caterpillars or silk worms eat day and night and increase enormously in size.

The larvae are kept in clean bamboo trays along with freshly chopped mulberry leaves. After 25 to 30 days the caterpillars stop eating and move to a tiny chamber of bamboo in the tray to spin cocoons. Small racks or twigs may be provided in the trays to which cocoons get attached. The caterpillar or silkworm spins the cocoon inside which develops into silk moth. The female moth lays eggs and this is how the life cycle continues.

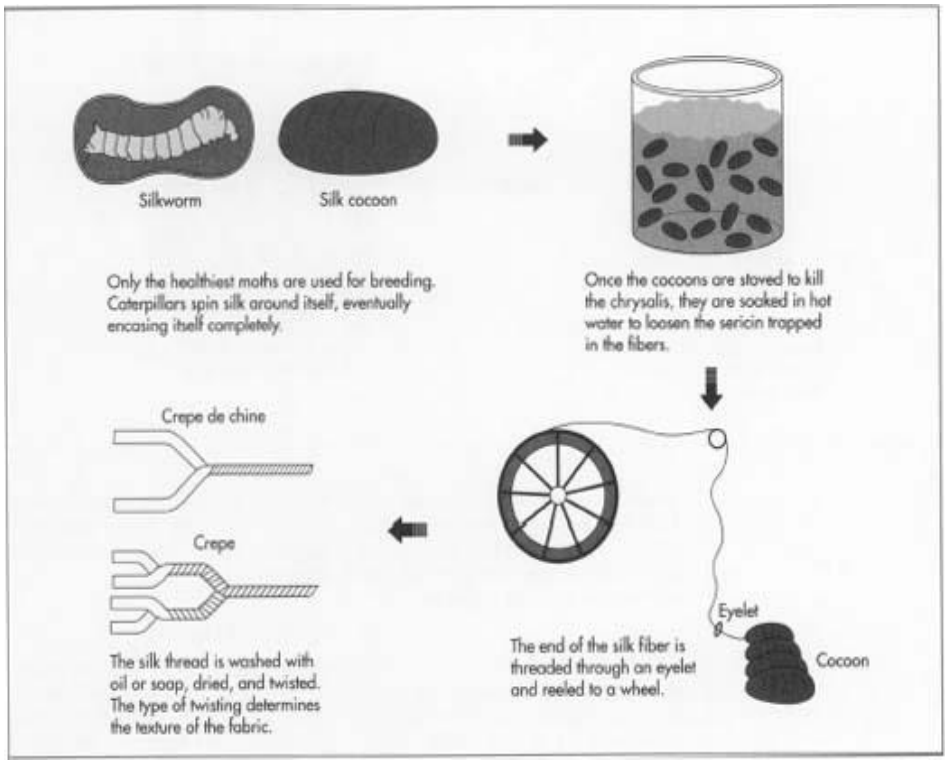


Fig.3.2 Cocoon to silk fibre

Reeling:

A pile of cocoons are used for obtaining silk fibres. The cocoons are kept under sun or boiled or exposed to steam. The silk fibres separate out. The process of taking out threads from the cocoon for use as silk is called reeling the silk. Reeling is done in special machines which unwinds the threads or fibres of silk from the cocoon.

Throwing:

As the fibres are combined and pulled on to the reel, twist can be inserted to hold the filaments together. This is called as throwing and the resulting yarn is 'thrown yarn'. This yarn goes to weaving or knitting industry based upon the type of yarn produced.

Spinning:

Short ends of silk fibres from the outer and inner edges of the cocoons and from broken cocoons spun yarn is produced in a manner similar to that used for cotton. This is called spun silk.

Degumming:

Sericin or gum makes up to 20% of the weight of the silk fibre. It is not usually removed until after the cloth is woven because, it serves as warp sizing that protects the yarns from mechanical injury during weaving.Before finishing, the gum is removed by boiling the fabric in soap and water.

Silk weighting:

When silk is boiled to remove excess of natural gum or sericin it loses weight. This loss of weight is replaced through treatment by metals like tin, aluminium etc in water solutions. These are not removed by washing.

Weighted silk is not durable because sunlight and perspiration weaken fibres. Heavy weighting causes silk to crack.

Varieties of silk:

Silk produced by moths of species other than Bombyx mori. It is brown in colour, more un even and coarser. It is called Tussar silk.

a. Waste silk or silk noil:

Short ends of textural spun yarns or in blends with cotton or wool, sometimes called waste silk.

b. Duppioni:

Silk yarns made from two cocoons that have been formed in an interlocked manner. The yarn is irregular and larger than regular filaments. It is used in making shantung and duppioni.

c. Spun silk:

Yarn made from short fibres from pierced cocoons and short ends and outside and inside edges of the cocoons.

d. Ahimsa silk:

The silk fibre is made out from the cocoons from which the moth has come out and not damaging the cocoon.

e. Wild silk: Silk produced by moths of species other than Bombyxmori. It is brown in colour,more uneven and coarser.It is usually called Tussar silk

Properties of silk:

The fibres are soft, supple strong and lighter in weight than any other natural fibre. Silk is prized for its lightness with warmth, sheerness with strength and with resiliency. Silk is a natural protein fibre where the protein fibroin is held by gummy substance.

Physical properties:

Microscopic structure:

Silk has its unique properties. It is soft, supple, strong, lighter in weight than any other natural fibre. Silk is priced for its weight. Silk is a natural protein fibre. Cultivated degummed silk has a smooth transparent rod-shapedstructure while silk with gum looks rough and has irregular surfaces.

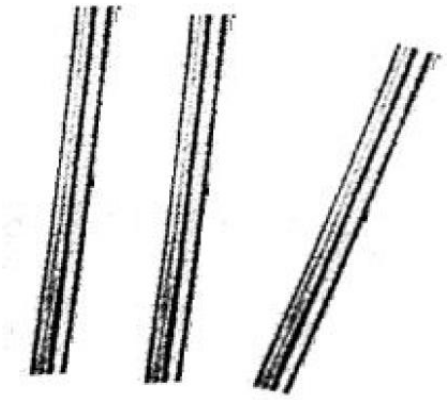


Fig: 3.3 Microscopic structure of Silk

On the other hand, wild silk is seen as uneven and dark. It may have some longitudinal striations seen in fig. In cross section silk shows triangular shaped fibres with no markings.

Burning test:

Silk burns slowly. It burns withburnt hair smell, but less pronounced than wool. Silk ash is round, crisp, black bead and easily crushable.

a. Composition:

Silk is primarily composed of proteins. It consists of carbon, hydrogen, oxygen and nitrogen in the ratio of C15 H23 N5 O6.

b. Strength:

Silk is the strongest of natural fibres. The length of the filaments provides a factor for its strength. It has a tenacity of 2.4 to 5.1 grams per denier.

c. Hygroscopic nature:

Silk fibre absorbs moisture but will not feel wet to touch and moisture does not spread on silk readily. That is why silk is ironed when half dry.

d. Resiliency:

Silk fabrics retain their shape and resist wrinkling well.

e. Heat conductivity:

Since silk is a protein fibre it is a non-conductor of heat like wool, hence it is used for winter apparel.

f. Absorbency:

The good absorptive property of silk also contributes to its comfort in warmer atmosphere. Silk generally absorbs about 11% of its weight in moisture, which makes silk easy in dyeing and printing.

g. Exposure to light:

Continuous exposure to light weakens silk faster than either cotton or wool. Hence it has to be protected from direct exposure to light.

h. Effect of friction:

The silk fabrics are affected by friction and it spoils the smooth texture. So excessive rubbing of silk fabrics during washing should be avoided.

i. Cleanliness and washability:

Silk is a hygienic material because its smooth surface does not attract dirt. It can also be easily cleaned using mild soaps or bydry cleaning.

Chemical Properties:

a. **Reaction to acids**:
   Strong acids destroy silk fibres while dilute acids do not affect silk.

b. **Reaction to alkalies**:
   Strong alkalis have harmful effect on silk but weak alkalis do not effect. Hence use mild or neutral soap for washing.

c. **Reaction to bleaches**:

   Strong bleaches containing sodium hypochlorite will deteriorate silk. Mild bleaches like sodium perborate and hydrogen peroxide may be used with normal caution.

d. **Affinity for dyes**:

   Silk has very good affinity to acid dyes, but their light fastness is unsatisfactory.

e. **Resistance to perspiration**:

Silk fabrics are damaged by perspiration. Silk itself deteriorates and the colour is affected, causing staining.

f. **Effect of moths and mildew**:

   Silk is not harmed by moths and mildew.

Finishes given to silk:

Degumming, weighting, calendaring, kiering (for body and lustre), embossing, singeing, water repellency and stiffening are the finishes given to silk fabric.

Silk blends:

Silk is blended with many other fibres. Silk and cotton, silk and linen, silk and wool are the common silk blended fabrics.

Uses of silk:

Silk is an expensive luxury fabric used for making different garments. Silk is used primarily in apparel and home furnishing items because of its appearance and cost. Silk is extremely versatile and can be used to create a variety of fabrics from sheer chiffons to heavy beautiful brocades and velvets. Because of silk's absorbency, it is appropriate for warm weather wear. Because of its low conductivity it is used for cold weather wear, also in furnishings silk is often blended with other fibres to add soft texture for furnishing fabric. Occasionally expensive or handmade rugs are made from silk.

Silk mark:

Fig. 3.4 silk mark

There are numerous other textile materials sold in the name of silk i.e. art silk, artificial silk. Silk mark is a certification mark in India for silk textiles. The mark certifies that the piece of textile which bears the mark is made of pure natural silk. Only authorized manufacturers of silk can use the label on their products. Giving an assurance of pure silk, the label protects and promotes silk. Silk mark is helpful to identify pure silk. Silk mark symbol shown in fig.3.4

Wool

History of Wool:

Wool was the one of the first fibres to be converted into fabric. Wool is a global industry, with Australia, Argentina, the United States and Newzeland serving as the major supplier of raw wool. Wool fibre grows from the skin of sheep which is composed of protein known as keratin. It has crimp and has scales on its surface depending upon the breed of sheep. The natural protein fibre consists of amino acids. Wool has 19 amino acids and keratin, protein and other organic acids. Its length usually ranges from 1.5 to 15 inches (3.8 to 38 centimetres) depending upon the breed of sheep. The diameter of wool fibre varies from 10-50 microns. Merino sheep produces the best quality wool which is originated from Spain.

Merino lamb's wool may have average 15 microns in diameter. Merino sheep could be bred to improve the fleece as the wool of wild sheep is coarse. The breeding of animals and the production of the wool fibre into fabric is more costly process consequently wool fabrics are more expensive. An average of about 8 pounds of fleece is obtained from the sheep. The interlocking of woollen fabrics is known as felting.

Wool is yellowish white fibre and has medium lustre. It is considered to be a weak fibre than many other fibres however other properties such as resiliency and elasticity compensate for low strength.

Classification of wool:

Classification by fleece:

Sheep are shorn of their fleeces in the spring depending on age of the animal.

1. **Lamb's wool:**

The first fleece sheared from a lamb about six to eight months old is known as lamb's wool. It is of fine in quality and soft texture.

2. **Hogget wool:**

Wool taken from 12 to 14 months old lamb that have not been previously shorn is the hogget wool.

3. **Pulled wool:**

When sheep is slaughtered for meat their wool is pulled.

4. **Cotty wool:**

Very poor grade wool

5. **Wether wool:**

Any fleece clipped after the first shearing is called wether wool.

6. **Virgin Wool:**

Wool that is shorn or processed for the first time is called virgin wool.

The differences between woollen and worsted yarns are as follows:

Woollen yarns	**Worsted yarn**
Short staple	Long staple
Carded only	Carded and combed
Slack twisted	Tightly twisted
Weaker	Stronger
Bulkier	Finer, smoother and even fibres
Softer	Harder

Weaving woollen fabrics:

Basically, the woollen yarns are woven using the plain weave or sometimes twill. Woollens are desirable for sportswear, jackets, sweaters, skirts, blankets and similar general use. These fabrics are generally napped to give smooth and warm effect.

Weaving worsted fabrics:

Worsted yarns are chiefly woven in twill weave. They are appropriate for tailored and dressy purposes for spring, summer coats, suits and for tropical skirts.

Blended wool mark

Fig.3.5 Wool mark

Wool is a trade mark employed on textile products as an assurance that the product is made of 100% pure new wool. The wool mark logo designed by Indian graphic artist Frances Co Saroglia, was launched in 1964 in Britain. The wool mark indicates that the product was made out of 100% wool. The wool mark blend symbol is for products containing a minimum of 50% new wool and the blend symbol represents products with 30-49% new wool.

Manufacturing of wool:

Wool is used for knitting sweaters or weaving shawls is the finished product of a long process which involves the following steps.

Shearing:

Sheep are generally shorn of their fleeces in spring but the time of shearing differs in different parts of the world. Machine clippers remove the fleece faster and closer than hand clippers. Superior quality of wool is from the sides and shoulder where it grows longer, finer and softer, is treated as good quality fleece. The fleece of the sheep along with a thin layer of skin is removed from its body. This process is shearing. Usually hair is removed during the hot weather.

Sorting and grading:

Skilled workers do sorting. Each grade is determined by type, length, fineness, elasticity and strength. Separating of fibre is done by touch and sight.

Washing and scouring:

For washing of wool, a series of four connecting tanks are used. Each tank, containing warm soap water and weak alkali. Fibres are washed in the first tank and rinsed in the others. In this way dirt, grease and dried perspiration is removed when the wool comes out from the last tank then it is soft and white. After scouring the wool is dried in humid atmosphere to preserve the elasticity and softness.

Carbonising:

The fibres are then put through a dilute solution of sulphuric or hydrochloric acid which destroys any vegetable matter. This process is known as carbonising.

To remove the grease and dirt in the raw wool, it is put through a series of naphthol baths followed by clear water to remove naphtha. This is called napthalation. This process improves the dye take up property of wool.

Drying and oiling:

Wool is now rinsed in clear warm water and spread out on racks to dry. Oiling is done to keep the wool soft and elastic.

Dyeing:

If the wool is to be dyed in raw stock it is dyed at this stage. Some wool fabrics are piece dyed, some are yarn or skein dyed and some are top dyed.

Blending:

Wool of different grades or pure wool fibres and other textile fibres may be blended mixed together at this point. All the information should be present on the labels.

Carding:

The carding process introduces the classification of woollen yarns and worsted yarns. It makes the fibre parallel and some amount of dirt is removed due to straightening of fibres. Fibres are used for the worsted yarn are more straightened than wool yarns.

Gilling and combing:

The carded wool is made,worsted yarn by combing operation. This process removes the shorter fibres of 1 to 4 inches in length, called combing noils, places the longer fibres as parallel as possible called tops and also removes any remaining loose impurities.

Drawing:

Drawing is an advanced operation for worsted yarns which doubles and redoubles slivers of wool fibres. The process draws, drafts, twists and winds stock, making the slivers more compact and thinning them into slubbers.

Roving:

This is the final stage before spinning roving is actually a light twisting operation to hold thin slubbers intact.

Spinning and Weaving:

In this stage, the wool fibres drawn out and twisted into yarn. Loosely twisted fluffy yarn is made into soft woollen material. The smoother, long tight and evenly twisted yarn is used to weave worsted. Woollen yarns are chiefly spun on a mule spinning machine, worsted yarns are spun on any kind of spinning-mule, ring, cap orflyer.

Properties of wool:

Microscopic structure of wool:

Wool has a rod like structure with rough surface of over lapping horny scales. When observed under the microscope the surface of the fibre seems to be consisted of scales irregular in shape and slightly over lapping like scales of fish.

Fig. 3.6 Microscopic structure of Wool

Burning test:

When wool fibre approaches the flame, it burns slowly. The odour of wool fibre is burning leather or hair. After removing from flame, the fire usually self-extinguishing. Its ash is crisp, dark and irregular shape and crushes easily.

Physical properties:

Composition:

The chief constituent of wool fibre is a protein known as keratin. This is the only natural protein fibre, containing sulphur. It has following elements in its composition carbon 50%, oxygen 22.25%, nitrogen 16-17%, hydrogen 7% and sulphur 3.4%.

a. **Strength**:

It is stronger than silk when wet, wool loses about 25% of its strength, hence care should be taken while washing. Longer the fibre the greater will be the strength of yarn.

b. **Resiliency**:

Wool is highly resilient and comes to its original shape when hung after being wrinkled or creased.

c. **Elasticity**:

Wool is highly elastic. It can be stretched by about 10-30% and when wet by 40-50% without breaking.

d. Effect of friction:

Friction will soften wool fibre, especially when wet and thus is advantageous in maintaining smooth texture of fabrics.

e. **Crimp**:

Wool fibre is more or less wavy and has twists. This waviness is termed as crimp. This property of having crimp gives elasticity to the fibre.

f. Heat conductivity:

Wool fibre is a poor conductor of heat and therefore the fabrics made from this fibre are considered most suitable as winter wear.

g. Effect of heat:

Mild heat has no effect, but higher levels of heat weakens the fibre and destroys the colour.

h. **Shrinkability**:

Wool is resistant to shrinkage. However long exposure to moisture may cause shrinkage.

Chemical properties:

a. Action of acids:

Dilute acids have little effect, but either hot or concentrated acid weakens or dissolves the wool fibres.

b. Action of alkalies:

Alkalies like NaOH attack the wool. Boiling 5% of NaOH dissolves wool within 5 minutes. However, borax and ammonia have no harmful influence on wool.

c. Action of bleaching agents:

Strong bleaching agent like hypo chlorites have a harmful effect on wool. Potassium permanganate, hydrogen peroxide however can safely be used for bleaching and stain removal.

d. Affinity for dyes:

Wool has high affinity for most of the dyes like acid and basic dyes.

e. Effect of moths and mildew:

Wool is easily damaged by moths that is why during storage of woollen garments special care is needed. However, mildew does not affect wool fabrics.

Finishes given to wool:

Felting, fulling, moth proofing, crabbing, decanting, London shrinking, napping, singeing and steaming, rot and mildew, anti-microbial finish and wrinkle recovery.

Wool blends:

Wool polyester, wool silk, wool nylon, wool cotton, wool acrylic.

Uses of wool:

Woollen fibres are used in apparel and home furnishings. In apparel it is used in coats, jackets, suits, dresses, skirts and slacks which are made from woven fabrics of varying weights suits, dresses, skirts and sweaters are made from knitted fabrics. It is also used in carpets and rugs which are used in winter season. Polyester is the most important fibre used in blending with wool.

Summary:

A good quality fibre (either silk or wool) is not cheap and prices are tending to rise. The consumer should identify the originality of the fibres and percentages of each fibre and selling point on the label. Blends of both natural and manmade fibres have grown in importance.

Short Answer type questions:

1. Define sericulture
2. Name the four stages in the life cycle of a silk worm
3. Explain ‘reeling’
4. Explain ‘degumming’

5. Explain ‘throwing’
6. What are the uses of silk?
7. Draw the microscopic appearance of silk
8. State the reaction of silk fibre during burning test
9. List out the classification of wool
10. Define crimp
11. What are the uses of wool?
12. Draw the microscopic appearance of wool
13. What is felting?
14. What is degumming?
15. List out varieties of silk.
16. Define reeling
17. State the reaction of wool fibre during burning test

Long Answer type questions:

1. Explain the life cycle of silk worm
2. Explain about the processing steps of silk fibre
3. Write down the properties of silk
4. What are the various types of silk?
5. Explain the manufacturing process of wool fibre
6. Write the properties of wool
7. How is wool classified?
8. Why and how is scouring done?
9. What are the differences between woollen and worsted yarns?

Unit 4

MAN-MADE AND REGENERATED-RAYON AND POLYESTER

Structure:

Introduction

4.2Rayon Fibre

4.3Polyester fibre

Learning objectives:

After studying this unit, the student will be able to

- Understand the manufacturing process of Rayon
- Identify the structure of Rayon fibre
- Physical and chemical properties of Rayon
- Uses of Rayon
- To know the manufacturing process of Polyester
- Physical and chemical properties of Polyester
- To identify the fibre and end uses of Polyester

Unit Preview:

The regenerated man-made rayon fibre is made out from wood pulp with different chemicals. The fibre is used as silk substitute sometimes. The properties, finishes and end uses are described. This unit also gives us the information regarding the manufacture and properties of polyester also.

Introduction:

Rayon fibre was the first man-made fibre composed of pure cellulose. The substance of which is the main constituent of cell walls of trees and cotton. Rayon fibres are made from cellulose that has been reformed or regenerated

consequently, these fibres are identified as ‘regenerated cellulosic fibres’. Because of its lustre and soft feel, it resembled silk and came to be known as "artificial silk". However, it is more like cotton in its chemical composition.

Rayon Fibre :

Robert Hooke, the English naturalist had prophesied the production of a fibre such as rayonthe first manmade fibres long ago in 1664. He believed that it was possible to make an ‘artificial glutinous composition much resembling, if not fully like that of silk worm secretion into a filament. In 1840, an apparatus was invented that drew synthetic filaments through small holes. In 1855, Georges Andemars, a Swiss chemist, discovered how to make cellulose nitrate. This was the first step towards the nitro cellulose process of making rayon. In 1884, Count Hillarie de chardonnet produced the first man made textile fibres from nitro cellulose. He because known as the “Father of Rayon”.

In 1890, L.H. Despaisses of France developed the cupra-ammonium process for making rayon, which had some properties that were superior to those of nitro cellulose rayon. Man-made textile filament was officially recognized so, in 1925, when the Federal Trade Commission (FTC) permitted the use of the name “rayon” for yarns obtained from cellulose or its derivatives.

There were basically two groups of rayon- one consisting of regenerated pure cellulose (Viscose rayon). The other of a cellulose compound (acetate rayon). In the chemist's terminology rayon and acetate are not synthetic because natural materials-cotton linters and wood pulp are used in their manufacture, rather than chemical elements.

Manufacture of Rayon:

All types of Rayon are made from cellulose. There are four main procedures by which cellulose is transformed into rayon. They are

a) Nitro cellulose process
b) Cupra ammonium process
c) Viscose process
d) Cellulose acetate process

The general principles of rayon yarn production involve the following steps.

a) To treat cellulose chemically for rendering it to form to liquid
b) To force the liquid through fine holes
c) To change from liquid stream into solid cellulose filaments

The Viscose process:

The following are the sequence of operations

a) In this process wood from spruce tree(spruce chips) are used as raw material. From the raw material, the bark is removed, the wood is cut into small chips.

b) The small chips are then treated with calcium bi sulphate and cooked with steam under pressure. This wood pulp is bleached and purified for cellulose base.

c) This wood pulp is treated with caustic soda to form alkali cellulose. Wood pulp is steeped in NaOH for 1-4 hours. Finally, alkali cellulose is obtained.

Cellulose+ caustic soda→ Alkali cellulose +water (soda cellulose)

d) **Pressing, shredding**:

Excess alkalies are pressed down. This alkali cellulose ground up into fine crumbs (fine mass)

e) **Ageing**: The fine crumbs are allowed to rest in for 1-1.5 days

After ageing this is mixed with liquid carbon disulphide to form cellulose xanthate

Alkali cellulose+ carbondisulphide→ cellulose xanthate

f) **Mixing**:

The cellulose xanthate is dissolved in dilute caustic soda solution. A reddish orange liquid is formed. This liquid is filtered and stirred continuously for 4-5 hours to get thick fluid which is known as viscose.

g) **Ripening**:

This viscose solution is stored for 4-5 days in humidity control room. During storage it ripens, now the solution is ready for spinning.

h) This liquid is forced through fine jets (0.5- 0.1mm nozzles) into coagulating bath which contains dilute sulphuric acid and sodium sulphate. By this coagulating bath the viscose solution is regenerated or converted into continuous filament. Thus, the viscose rayon filament is manufactured.

Raw material (wood from spruce tree)
Removal of bark, cut into chips
↓
Purification of Raw material
↓
Steeping
↓
Pressing, Shredding
↓
Ageing
↓
Xanthation
↓
Mixing
↓
Ripening
↓
Filtration
↓
Spinning
↓
Cakes of Viscose

Flow chart for viscose rayon manufacture:

Characteristics of Rayon fabric:

- Highly absorbent
- Soft and comfortable
- Easy to dye
- Drapes well
- Abrasion resistance is poor
- No static build-up

Properties of Rayon:

Microscopic structure:

The fibre appears smooth and rounded. It has characteristic markings which vary according to process. Viscose rayon fibres are rod like with numerous longitudinal, thread like serrations or lines that are spiral and somewhat glossy. The longitudinal view of viscose rayon fibres shows many striations running parallel to the long axis of the fibres.They are rod like with no serrations or markings. They are fine and glossy and resemble silk more closely than other fibres. The cross-section appearance is small, smooth and nearly round, occasionally slightly oval

Fig. 4.1 Microscopic structure of Viscose Rayon

Burning test:

Rayon fibre when approaching flame smoulders and it burns slowly and smells like burning paper. Its ash is light grey, feathery.

Physical properties:

Composition:

Rayon fibre consists of cellulose.

a. Strength:

The tensile strength of viscose rayon is greater than that of wool but is only about half of that of silk. Viscose rayon is also weaker than cotton and linen. It loses strength when wet. Rayon when dry it regains its strength. This property should be notedduring washing process.

b. Elasticity:

Rayon fibre does not have natural elasticity. Pressure may weaken or split the fibre. Rayon clothes frail easily at elbows, knees and seams. Rayon requires greater seam allowances.

c. Effect of friction:

Friction causes holes or stretches the fabric and spoils its shape. So, friction should be avoided while washing the clothes.

d. Effect of heat:

Rayon fibre is damaged by excess heat. On using hot iron, rayon will perch.

e. Effect of moisture:

Rayon fibre absorbs more moisture than cotton and linen

f. Exposure to light:

Exposures to light weaken the rayon and rayon articles. These fabrics should not be kept under sunlight for long hours.

g. Dimensional stability:

Viscose Rayon fabrics tend to shrink more than cotton fabrics

h. Resiliency:

Viscose Rayon lacks the resilience natural to wool and silk. It creases readily

i. Heat conductivity:

Rayons are good conductors of heat.

Chemical properties:

a. Action of acids:

All rayons are weakened even by dilute solutions of acid.

b. Action of alkalies:

Alkalies destroy the lustre of rayons and while washing neutral soap has to be used.

c. Effect of bleaching agents:

Reducing bleaches may be used in cold dilute solutions. Oxidising bleaches will damage the fibres if not used with care.

d. Affinity to dyes:

Rayons generally take dye stuff easily (readily). The viscose fibres have great affinity for dyes and can be dyed with variety of dyes like acid, chrome and disperse.

e. Effect of moth and mildew:

Like cotton Viscose Rayon has tendency to mildew, such fabrics not be allowed to remain in damp conditions. Moths are not attracted to cellulose. Resistance to other insects is also similar to that of cotton, silver fish can attack rayon.

f. Resistance to perspiration:

It is fairly resistant to deterioration from perspiration.

Uses of Rayon:

Apparel:

Accessories, blouses, dresses, jackets, lingerie, lining, slacks, sports wear suits, ties.

Home furnishings:

Bed spreads, blankets, curtains, draperies, sheets, slip covers, table clothes, and upholstery.

Industrial uses:

Industrial products, medical products, non-woven products

Other uses:

Feminine hygiene products

Rayon blends:

A wide variety of blends of rayon is available in market and put to various uses. Cotton rayon, wool rayon, silk rayon, rayon linen, rayon nylon.

Polyester fibre

Introduction:

Polyester fibres are long-chain polymers produced from petrochemicals. Polyester fibres are formed from the chemical reaction between an acid and an alcohol. The term polyester indicates that poly means many and ester means an organic chemical compound. Polyester is the most commonly used synthetic fibre.

Polyester Fibre :

Polyester is a synthetic fibre invented in 1941. The first polyester fibre is known as ‘Dacron’ in America, ‘Terylene’ in Britan.

The ground work for development of polyester fibre is done by W.H. Carothers. Polyester fibre is the long chain polymer produced from elements derived from coal, air, water and petroleum. Polyester is a thermoplastic fibre and has good strength. It melts in flame and forms a grey hard non-crushable bead. It is an easy-care fabric and can be easily washed. It is mostly blended with other fibres to improve its absorbency and to lower static electricity.

Characteristics of polyester fibre:

The manmade fibres with non-cellulosic base like polyester have the following plus qualities.

- Dimensional stability
- Strength and durability
- Ease of care
- Wrinkle resistance
- Comfort and fit(elasticity)
- Resistance to moths and mildew

Method of manufacture:

Different companies produce their own variety of polyester, though there are likely modifications under specific trademarks.

PET (Principal raw material is ethylene diamine and terephthalic acid obtained from petroleum PCDT polyester).

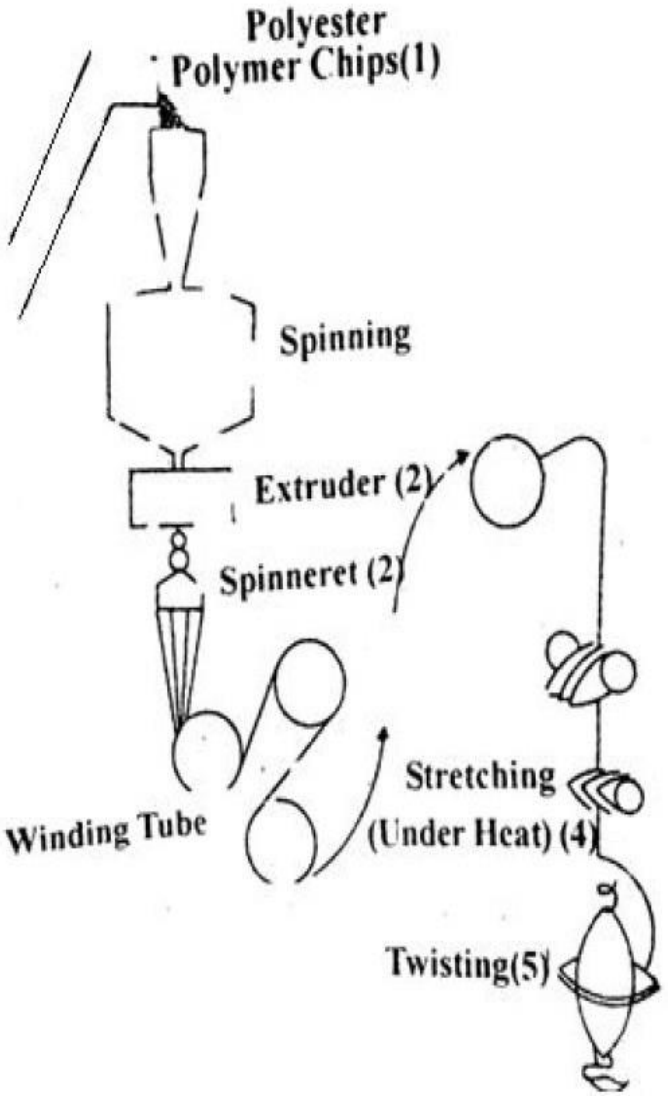


Fig. 4.2 Flow chart of manufacturing process of polyester

PET Polyester:

- The principal raw material is ethylene which is obtained from petroleum. This is oxidised to produce dihydric alcohol.
- This alcohol is combined with terephthalic acid in an auto clave at high temperature in vacuum.
- Polymerisation takes place with the aid of catalysts.
- A clear, colour less, molten polyester then flows in the form of ribbon. These ribbons are cooled until they are brittle.

- The polymer is then cut into very small chips, dried to remove all traces of moisture and blended for uniformity in preparation for spinning into yarn.
- The chips are melted at (260-270 degrees Celsius) to form a syrup like solution.
- This is extruded through a spinneret and the filaments are subsequently drawn into the desired polyester fibre.
- The fibres are drawn or elongated.
- They are usually drawn to 5 times their original length

Types of polyester yarn:

The diameter of the polyester yarn is determined by

a) The rate of extrusion of filaments from the spinneret
b) The number of spinneret holes to match the number of filaments

Properties of polyester:

Microscopic structure:

The fibres are uniform in diameter, have smooth, structureless surfaces and are highly transparent.Polyester is produced from ethylene glycol and dimethyl terephthalate. These fibres are generally round and uniform. The fibre is partially transparent and white to slightly off-white in colour.

Fig. 4.3 Microscopic structure of polyester fibre

Burning test

When polyester fibre approaches the flame. It fuses and shrinks away from flame, when it is in flame burns slowly with melting. It gives slightly sweetish smell. The ash of polyester fibre is hard black bead.

Physical properties:

Composition:

Polyester is produced from ethylene glycol and dimethylterepthalate

a. Strength:

The PET polyesters are in general stronger. Polyester is found in industrial uses and highly durable fabrics.

b. Elasticity:

Polyester fibres do not have high degree of elasticity. In general polyester fibre is characterised as having high degree of stretch resistance, which means that polyester fabrics are not likely to stretch out of shape too easily.

c. Dimensional stability:

Polyester fabrics do not shrink and they have excellent dimensional stability.

d. Resiliency:

Polyester has excellent resistance to wrinkling and creasing both when dry and wet. Durable pleats can easily set in polyester. It retains its shape and recovers easily to original shape.

e. Effect of heat:

Polyester is affected by excess heat and therefore it should be ironed at lower temperatures.

f. Exposure to light:

Polyester has good resistance to degradation by sunlight. Therefore, they are well suited for outdoor use.

g. Effect of moisture:

Polyester fabrics have a low moisture absorbency. It is easily washed and dries quickly.

h. Effect of friction:

There is no effect of friction. It is very strong and has high resistance to rubbing.

i. Cleanliness and washability:

Since polyester fibres are generally smooth, have low absorbency, many stains lie on surface and are easily washed by hand or machine but oil stains are very hard to remove.

Chemical properties:

a. Reaction to alkalies:

Polyester is resistant to weak alkalies but is soluble in boiling 5% sodium hydroxide solution

b. Reaction to acids:

Polyester is resistant to all acids even if it is exposed to concentrated acids and at high temperature

c. Effect of bleaches:

It is resistant to oxidising bleaches and is not damaged by them

d. Affinity for dyes:

Polyester has a good affinity for dyes and can be dyed in a complete range of colours.

e. Effect of moth and mildew:

It is moth proof and mildew proof and is not affected by insects and bacteria.

f. Resistance to perspiration:

Polyester has no loss of strength from continued contact with either acid or alkaline perspiration.

Polyester blends:

Polyester cotton, polyester wool, polyester rayon, polyester silk, polyester acetate blend polyester and nylon are some common blends.

Uses of polyester:

The most important use of polyester is in woven fabrics. The blended fabrics are attractive, durable and comfortable, retain their appearance well, and are easy care. The first use of staple polyester was in tropical suiting for men's summer suits. The suits are light in weight and machine washable, something unique in men's clothing.

In home furnishing polyester blends are widely used in sheets, blankets, bed spreads, curtains that match bed spreads, mattress and table clothes. They are being used in more upholstery fabrics. Polyester carpets have a softer hand than nylon carpets.

The other important use of polyester is in a specialized area fibre fill used in pillows, comforters, bed spreads other quilted household and apparel fabrics and winter jackets.

Non-woven fabrics are the fourth important use of the polyester fabrics. Sewn in interfacings, fusible interfacings, pillow covers and mattress interlinings.

It has many industrial uses too in pile fabrics, tents, ropes, cording, finishing line, cover stock for disposable diapers, garden houses, sails, seat belts, filters, fabrics used in road and buildings, seed and fertilizer bags, artificial arteries, veins, hearts and sewing threads.

Summary:

Consumers are more aware of the fibre content of their garments with rayon and polyester and their blends. The man-made fibres like rayon, polyester have qualities of stability durability, comfort, wrinkle resistance and ease of care.

Short answer type questions:

1. What are regenerated cellulosic fibres?
2. Mention the names of various rayons.
3. Who was the Father of rayon?

4. Draw and explain the microscopic structure of rayon.
5. Why rayon fibre is called as artificial silk?
6. Why is rayon suitable for summer?
7. What is the raw material for rayon production?
8. What is the raw material for polyester?
9. Why stains are easily removed from polyester?
10. Draw and explain the microscopic structure of polyester
11. What is the melting temperature for polyester chips?
12. What are the uses of polyester?

Long Answer type questions:

1. Explain the manufacturing process of rayon by viscose process
2. Write in detail about the uses and blends of rayon fibre.
3. Write down the chemical properties of rayon
4. Write the physical properties of rayon
5. Explain the manufacturing process of polyester with diagram
6. Write in detail about the uses and blends of polyester fibre
7. Write down the physical properties of polyester.
8. What are the chemical properties of polyester?

Unit 5

Spinning and Yarns

Structure:

Learning objectives:

After studying this unit, the student will be able to

- To understand the methods of spinning
- To study about classification of yarns
- To identify different types of yarns
- To identify the application area of novelty yarns
- To understand yarn counting system and yarn twist
- To understand the characteristics of warp and filling yarns

Introduction:

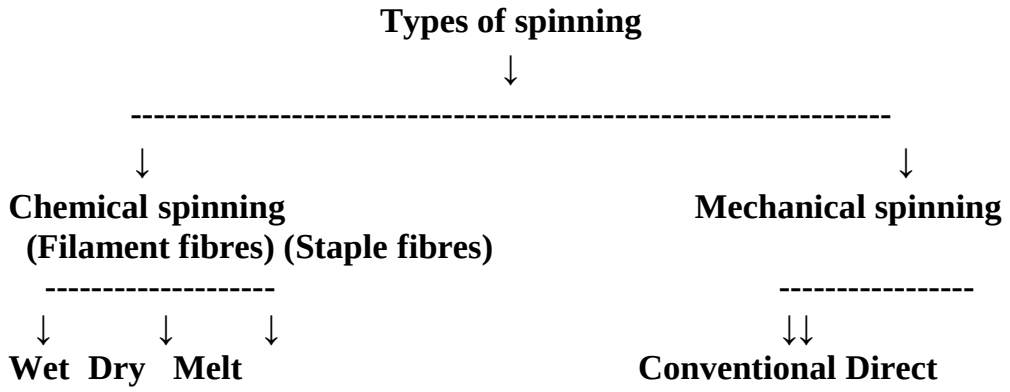
Spinning is the process of drawing out and twisting of a group or bundles of fibres into a continuous thread or yarn of sufficient strength to be woven or knitted fabrics.

There are different types of yarns, each having its own characteristics. These characteristics vary according to the construction and the treatment given in the manufacture of yarn. Yarn is the generic name for the assemblage of fibres that is laid down or twisted together. As discussed earlier, these are staple and filament yarns that are used in clothing.

Types of spinning:

Depending upon the fibres, the preparatory methods of spinning are classified into two types:

1. Chemical spinning-for filament fibres
2. Mechanical spinning-for short staple fibres



1. **Chemical spinning**:

This is used to make manmade fibres into yarns. A viscose solution is extruded through a nozzle like device called spinneret. Manmade fibres are made into yarns by chemical spinning.

2. **Wet spinning**:

This is done for acrylic, rayon and spandex. Chemicals are used to dissolve the material and the fibre spun is subjected to chemical bath. The fibre solidifies by coagulation bath. It is the oldest and complex process.

These filaments strands are then drawn out of the bath, washed and dried before being wound on the spools. Washing and bleaching is required before the use.

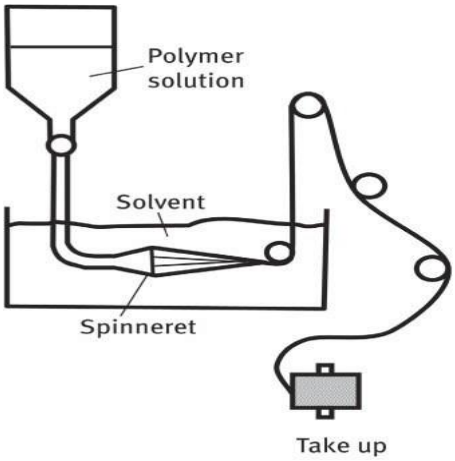


Fig:5.1 Wet Spinning

Dry spinning:

This method of spinning is followed for acetate, acrylic, modacrylic and spandex. The solvent dissolves the raw material and fibres sent into warm air. Later the solvent is evaporated. The air reacts with extruded streams causing them to solidify twisted and /or processed further and then wound onto spools. The fibre does not require any washing. It is the direct process.

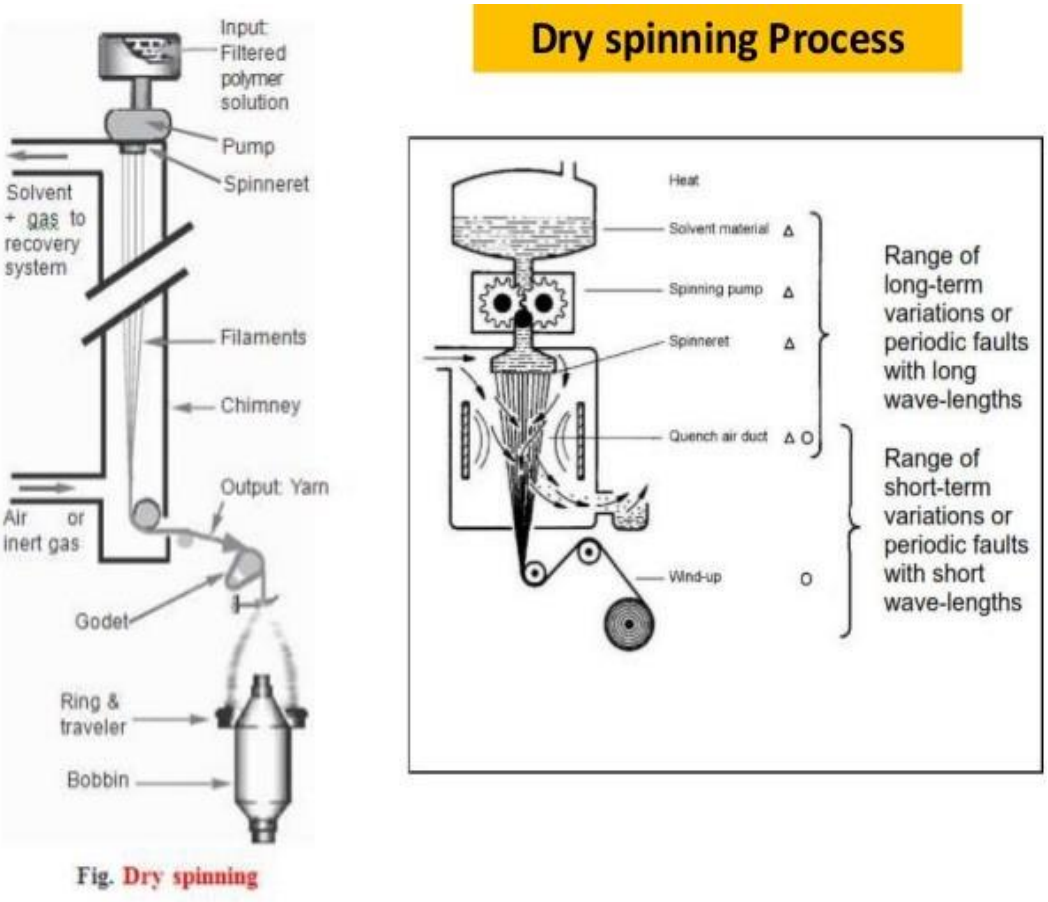


Fig. Dry spinning

Fig:5.2Dry spinning

Melt spinning:

This is used to spin nylon, polyester and olefin fibres. It is a direct process and least expensive. The raw material is melted in an auto clave and spun into yarn. The fibre solidifies by cooling. The process may not require any solvent and get different fibre shapes based on the spinneret shape. The extruded stream cool and solidify into continuous filaments and are then drawn out of the chamber twisted and/or processed further and subsequently wound onto spools.

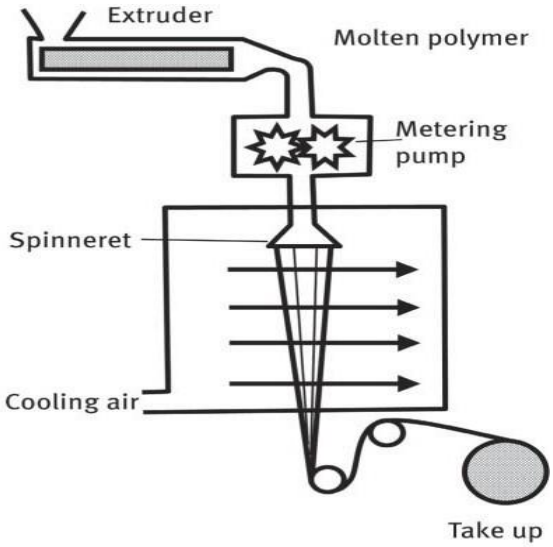


Fig:5.3 Melt Spinning

3. **Mechanical spinning**:

It refers to multi step procedure in which machines physically manipulate and spin fibres into yarns. There are two types of mechanical spinning.

1. Conventional spinning
2. Direct spinning

Conventional spinning:

The steps in the processing are preparation, forming the laps, carding, doubling, combing, drawing, roving and spinning. Filament yarns also sometimes purposefully cut to staple length and spun in the mechanical spinning method to obtain yarn with cotton/wool feel.

Direct spinning:

It is used to produce staple yarns from manmade filament fibres. It is less expensive. In the direct spinning, web like structures of filament fibres are stretched broken at intervals producing long staple fibres. The fibres are then drawn into slivers. The remaining spinning process is done by following steps:

Filament fibres stretched
↓
Breaking
↓
Drawing
↓
Roving
↓
Spinning

Generic classification of yarns :

Yarn is the generic name for an assemblage of fibres that is laid or twisted together. As fibres are classified into its generic nature, yarns can also be classified into three types. This is mainly to identify the particular yarn and assume or relate to its properties. For convenient identification, yarn may be grouped into three types.

1. Simple yarns
2. Novelty yarns/Complex yarns
3. Textured yarns.

Simple yarns:

Yarns that are even in size having an equal number of turns per inch throughout and relatively smooth are called simple yarns. These yarns can be made easily by assembling fibres. These yarns can be made used in weaving and knitting.

1. **Single yarn**:

It is the product of the first twisting operation that is performed by the spinning machine.

A ply yarn two or more than two single yarns are twisted together to form a ply yarn. These yarns are known as multiple strand yarns. If two single yarns

are twisted together, the resulting yarn is known as two ply-yarn. If three are twisted together three-ply yarn and soon.

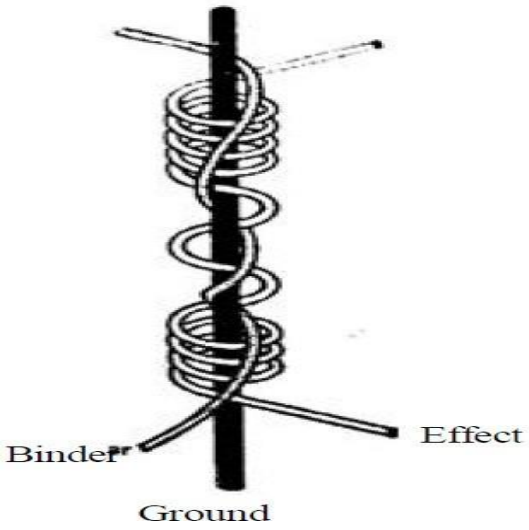
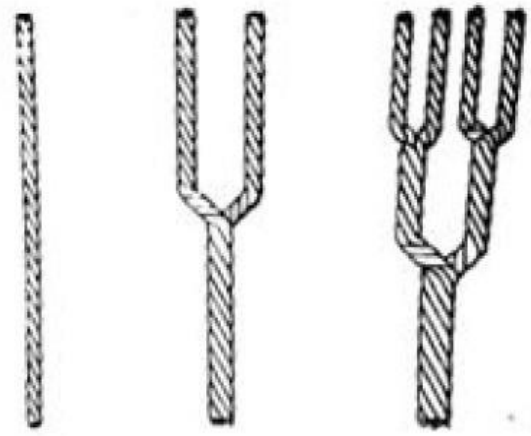


Fig: 5.4 Parts of Yarn

A cord/cable is made by a third twisting operation, which twists ply yarns together. Some types of sewing threads and some ropes belong to this group. Cords are generally not used in apparel fabric but used in industrial weight fabrics.



(a) Single yarn (b) Two ply yarn (c) Cord yarn

Fig:5.5 Types of Yarn

2.**Novelty yarns/complex yarns**:

A novelty yarn is yarns that are irregular at regular intervals. Fancy yarns aremore common in drapery and upholstery fabrics than apparel fabrics. The special arrangement is required for making the curled, twisted and looped yarn. The yarns are used in weft direction of the fabric.

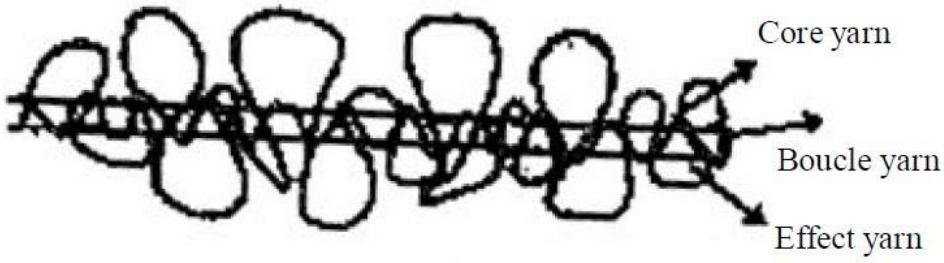


Fig: 5.6 Parts of Novelty Yarns

Types of novelty yarns:

i)Slub yarn:

This is a thick and thin yarn made by varying the amount of twist in the yarn at regular intervals. They are found in drapery and upholstery fabrics.

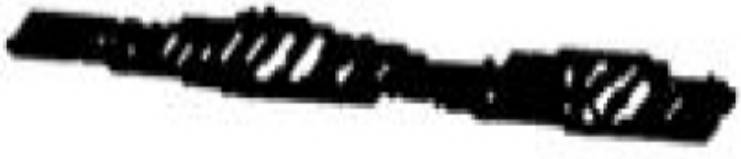


Fig: 5.7 Slub Yarn

ii)**Thick and thin yarns**:

These are similarto slub yarns but these are made from filament fibres. The pressure forcing the spinning solution is varied so that the filaments are thick in some places and thin in some. Eg: Thick and thin yarn.

Fig:5.8 Thick and Thin yarn

iii)**Knot Yarn**:

The prominent bunches of one or more of the component yarn present at regular or irregular intervals.

Fig: 5.9 Knot Yarn

iv)Spiral or corkscrew/Eccentric Yarn:

It is made by twisting together two piles that differ in size, type or twist. These two parts may be delivered to the twister at different rates of speed.

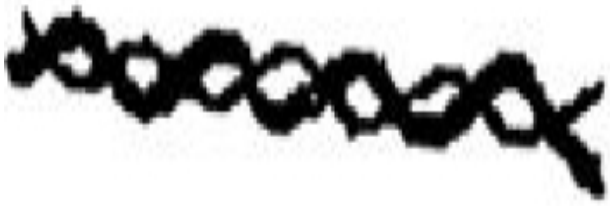


Fig: 5.10 Spiral or Cork Screw Yarn

v) **Chenille yarn**:

These create special effects. Chenille means cater pillar in French. The weft is inserted in normal manner. These are cut into wrap way threads.

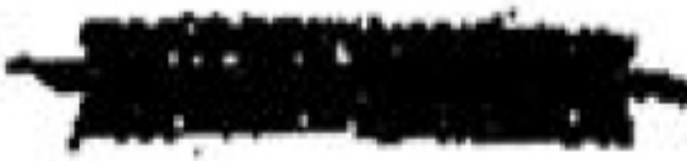


Fig: 5.11 Chenille Yarn

vi) **Cloud Yarn**:

A two coloured yarn, in which both yarns take it in turns to obscure or cloud the other, giving the appearance of an intermittent colour change.

3. Textured Yarns

Texturing is a treatment usually given to a manmade filament, after which, it becomes curly or acquires some forms of loops, coils or crimp. These are filaments or spun yarns with notably greater apparent volume than a conventional yarn. Fabrics made from these yarns maintain their original size and shape during wear and care.

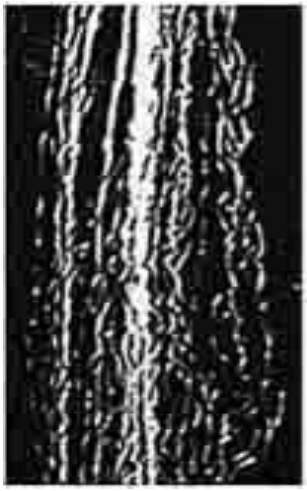


Fig: 5. 12 Textured Yarn

Stretch yarn:

Stretch yarns are frequently continuous-filament, manmade yarns that are very tightly twisted, heat set and then un twisted producing a spiral crimp giving a springy character.

Bulk yarns:

Bulk yarns are softer and much pliable then tightly constructed twisted yarns. Bulk yarns are also having a better cover. They create less transparent fabrics.

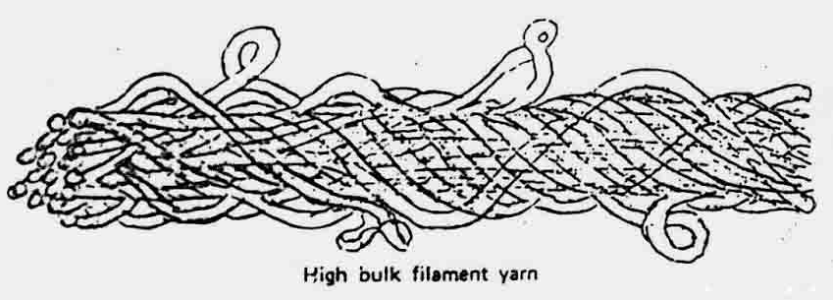


Fig: 5.13 Bulk yarn

5.4 Classification according to the usage of yarns:

According to usage of yarns, particularly in garment construction, there are two types of yarns. They are warp yarn and filling yarns. These yarns interlace at right angles to one another for making fabric. They have different characteristics and the cloth performs differently in the warp and filling directions.

Characteristics of warp yarns:

Warp yarns run along the length of the fabric and parallel to the selvedge of the fabric. Warp yarns are stronger and they are intended to resist the high tensions of the loom and the abrasion of the shuttle. Warp yarns should also be of good quality with good twist. These length wise warp yarns are called lengthwise grain of fabric. It is also referred to as straight grain. Warp yarns are usually stronger and heavier and stretch less. Warp yarns are also called ends in a fabric.

Characteristics of filling yarns:

Filling yarns run along the width of the fabric. Filling yarns are elastic and stretch more. They are apt to be decorative or special function yarns such as high twist crepe yarns or low twist napping yarns.

Ways to recognize warp and filling yarns:

1. The selvedge always run in the lengthwise(warp) direction of all fabrics
2. Most fabrics stretch less in the warp direction
3. The warp yarns lie straighter in the fabric
4. Filling yarns are more of decoration and special function yarns

Yarn fineness- count Denier:

Yarn count is a numerical expression which defines its fineness or coarseness. It also expresses whether the yarn is thick or thin.

A definition yarn is given by textile institute-

Countis a number indicating the mass per unit length or the length per unit mass of yarn.

Direct system:

In this system the yarn count expresses the number of weight unit in one length unit. The higher the count, coarser the yarn. This method is used to express the count of manmade fibre, Jute silk. The following formula for count is measured.

$N=(W/l)/(L/w)$

Where N= yarn count
W= the weight of the sample
L =the length of sample
l= the unit of length
w= the unit of weight

Tex, denier, pounds per spindle is the unit which is expressed in direct system

1. **Tex**:

   The yarn number or count in the Tex system is the weight in grams of 1000 m or 1 km of yarn

   Tex= weight in grams/1000mts of yarn

2. **Denier**:

   The yarn count in denier system is the weight in grams of 9000 m or 9 km of yarn.

   Denier= weight of yarns in grams/9000 meters or 9 km of yarn

   1 Denier= 9000mts weight /1 gm

3. **Pounds per spindle**:

   The yarn count in pounds per spindle is the weight in pounds of 14,400 yards of yarn. Jute count is expressed by this system.

Indirect system:

In this system the yarn count expresses the extent of length in one weight unit. Thus, higher the count finer the yarn. The count is based on the number of hanks(1 hank is 840 yards) in 1 pound of yarn.

Count= Length/one pound

Count=No of hanks x 840 yards/one pound

Yarn Twist:

Twist is the spiral arrangement of the fibres around the axis of the yarn. The number of twists is referred to as turns per inch.

Direction of Twist:

The direction of twist is describedas S-twist and Z – twist. S-twist when held in a vertical position, the spirals conform to the direction of slope of the central portion of the letter S.

Z twist is the standard twistused for weaving yarns. The majority of single yarns are spun with twist in Z direction.

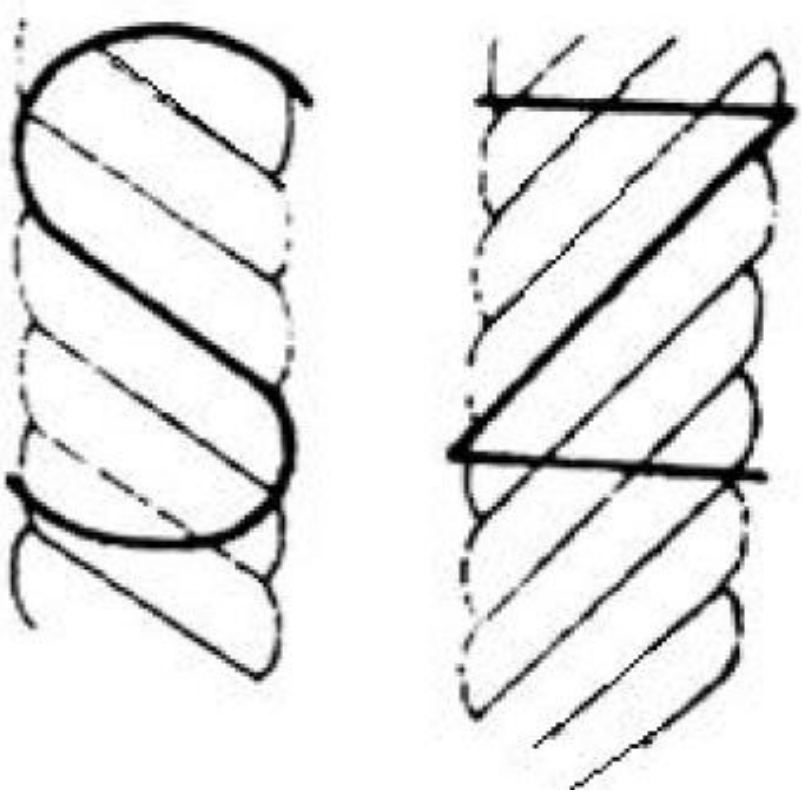


Fig:5.14 Direction of Twist

The amount of twist varies with

1. The length of fibres
2. The size of yarn
3. The intended use

Increasing the amount of twist up to the point of perfect fibre to fibre cohesion will increase the strength of yarns.

Summary:

Depending upon the fibre the preparatory methods of spinning are classified. Yarns can be classified as per the generic nature as simple yarns, complex yarns and textured yarns. They can be classified as per its usage as lengthwise yarns and crosswise yarns and this classification is very useful in garment construction. Yarn count also discussed. Thus, yarns play an important role in textile industry.

Short Answer type Questions:

1. What is a yarn?
2. What is yarn twist?
3. What is yarn count?
4. Write about Tex system
5. What are simple yarns?
6. What are complex yarns?
7. Write short notes on textured yarns
8. Classify the types of spinning
9. What is spinning?
10. Write any two ways to recognize warp and filling yarns
11. Which yarn is stronger in a fabric and why?
12. Write any two characteristics of filling yarns

Long Answer type questions:

1. Write in detail the generic classification of yarns
2. Explain in detail about two types of yarns in a fabric
3. Write about novelty yarns
4. Write the classification of spinning
5. Explain yarn count methods
6. Define the following terms

a) Count b)Denier c) Twist

Unit 6

FABRIC CONSTRUCTION METHODS

Structure :

Introduction
Weaving
Knitting
Non-Woven Fabrics

Learning Objectives:

After studying this chapter, the student will be able to

- To learn about different types of fabric construction methods.
- Know about Weaving and get familiar with weaving process
- Classification of Knitting
- Understand the non-woven fabrics and their uses

Introduction :

The fabric forming / construction process determines the appearance and texture. Fabric is the material used to make clothing or household articles.

The second successive stage in the making of a fabric is understanding the various methods of creating fabrics. The fabric construction methods include weaving, knitting and non-wovens. The cost of the fabric in relation to the construction process depends upon the number of steps involved and the speed of the process.The fewer the steps and the faster the process the cheaper is the fabric. The process often denotes the name of the fabric.

For example – felt, lace, double knit and jersey.

Weaving:

Garments can be made by turning the yarn into fabrics by weaving, knitting or felting. Woven fabrics are made by interlacing,two sets of yarns at right angles to each other. The length wise yarns are called warp yarns. The

width wise yarns are called weft yarns or filling yarns. Selvedge is the length wise edge of the fabric.

Grain indicates the direction parallel to either the warpor weft. 45degree angle to both the warp and weft is termed as bias. The stretch is maximum along the direction of the bias. Woven fabrics have best drape in bias direction.

Plain weave is formed by interlacing warp and filling yarn, in a pattern of over one and underone. For the second row it is reverse. Repetition of these rows gets the pattern of plain weave. Rib weave and basket weave are the variations of plain weave.

A twill weave is characterized by diagonal lines on the face or the back of the fabric. Each warp or filling yarn floats across two or more filling yarns with a progression of interlacing by one to the right or left to form a distinct diagonal line or wale.

The interlacing of warp and filling yarns is irregular in satin weave.The large number of variations of methods of interlacing the warp and weft threads make different types of weaves. They produce wide variety of fabrics; each fabric has special properties and uses.

The warp beam located in the back of the loom is a large roller on which warp yarns are wound holding the warp yarns between them to be wound on another roller. For weaving plain weave the threads are drawn through the eyes of two sets of heddles.

The filling threads pass over and under alternate warp threads which are lifted and lowered by the corresponding heddles.

Toe cop with the filling threads is placed in a shuttle which is moved or thrown from side to side across the loom. Each pass of the shuttle lays one filling thread. The comb like reed beats the filling threadstight against the preceding fill threads as the fabric is woven it is slowly wound onto a roller in front of the loom.

Knitting:

Knitted fabrics are constructed with a single yarn that is formed into interlocking loops by the use of hooked needles. The loops may be either loose or close constructed, according to the purpose of the fabric. The interlocking of the loops of the knitted construction permits the fabric to stretch in any direction.

The knitting characteristics are:

- ❖ Bulky with the surface effect
- ❖ Loosely knitted or tightly knitted
- ❖ Types - Rib – Purl – Tricot

Needles used in knitting are:

1) Latch needle
2) Spring beareded needle
3) Compound needle

Construction of knitted fabric:

The construction of knitted fabrics is evaluated by the number of stitches or loops. When the interlocking loops run length wise, each row is called a wale. A wale corresponds to the direction of the warp in woven fabric.

When loop runs across the fabric, each row is called course. A course corresponds to the filling or weft yarn. If the cloth has more courses, the cloth will be more rigid and stable in length. If the fabric has more wales in length it shrinks less in width. If the fabric has more courses in width it shrinks less in length.

Knits are classified into two types:

a) Warp knits
b) Weft knits

Warp Knits:

Series of yarns form wales in the length wise direction of the fabric. Warp knitting differs from weft knitting. In this, each needle loops its own thread. The needles produce parallel rows of loops simultaneously that are inter locked in a

zigzag pattern. Warp knitting may be flat or tubular and can be produced in many varieties of patterns. It can yield cloth with a dimensionalstability almost equal to that of woven fabric.

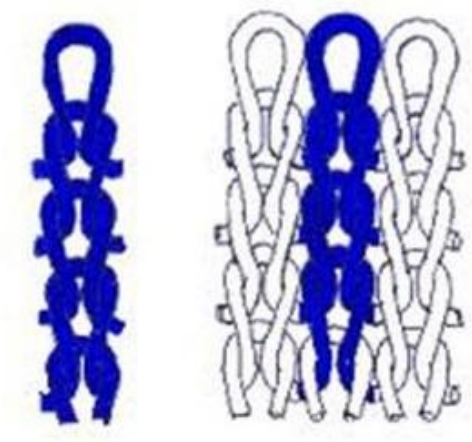


Fig:6.1 Warp Knit fabric

Ex: (a) Double warp (two bar tricot) (b) Single warp (one bar tricot).

Milanese knit, Simplex knit, Raschel knit,Jacquard.

Weft Knitting:

The hand method of knitting is weft knitting. One continuous yarn forms courses across the fabric. On a machine, the individual yarn is fed to one or more needles at a time. There are three fundamental stitches in weft knitting (1) Plain knit stitch (2) Purl Stitch (3) Rib – stitch.

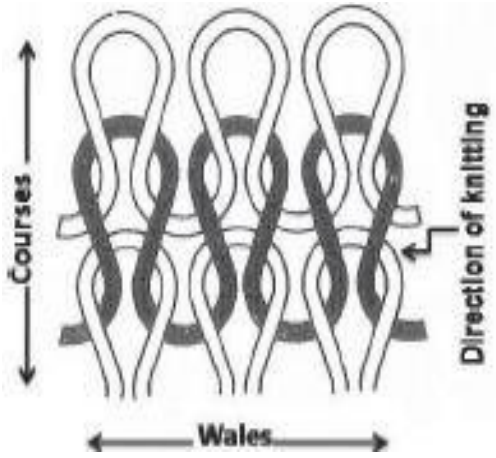


Fig:6.2 Weft Knitting

Common Knit Fabrics:

Jersey :

It is also known as single knit. Fabrics of this type have all loops drawn to one side of the fabrics and are mostly easily recognized by the fact that the smooth side is the face of the back has textured or mottled appearance It has low stretch in the width and curls at the edges.

Rib knit :

They have length wise ribs alternating on the face and back. To identify rib knit fabrics it may be necessary to stretch the fabric width wise.The appearance of alternating columns of plain stitches in the length wise direction is evidence of rib knit. Rib knit lie flat and do not curl like Jersey knits. Rib knits have greater elasticity in width than the length and are often utilized for cuffs, neck lines collars, sweater bottoms.

Inter lock:

It is a variation of rib knit and appears like two fabrics knitted back to back. These fabrics have low stretch, better shape retention and are easier to cut and sew.

Jacquard Knits:

They are intricate pattern and design similar to the woven Jacquards.

Pique:

It resembles a miniature honey comb pattern and is usually seen in sport wear.

Comparison of weaving with knitting:

Weaving	Knitting
a) Woven fabrics are constructed by the interlacing of two or more yarns which do not allow the fabric to stretch to any marked degree unless it is especially stretch woven.	a) The main advantage of knitted fabric is stretch ability where fit and comfort are the prime concerning factors.
b) Warmth giving property depends on the fibre used.	b) Knitted fabrics give warmth because of insulative air pockets.
c) Absorbency and weight of the fabrics wrinkle resistance, depend on weaving type.	c) Knitted fabrics are very absorbent, light weight and wrinkle resistant.
d) The fabrics are stable in wear and care. Many fabrics shrink less than 2%.	d) Knitted fabrics may shrink considerably more than 5%.

Non- woven fabrics:

Before weaving and spinning were invented, producing fabrics directly from fibres, matted together was in practice. Felting is the process of making fabric by the entanglement of fibres in the presence of heat, pressure and moisture.

Non-woven fabrics are defined as those fabrics which are made by fibres held together by bonding or the interlocking of fibres or both, accomplished by mechanical chemical, thermal or solvent means and the combination there of. Non-wovens are also called as formed fabrics or bonded fabrics.Non-woven

fabrics are soft, resilient and are less pliable. These are used as durable and non-durable fabric.

The durable non-wovens are inter facings,inter linings, home furnishing – draperies, furniture, upholstery and mattress, padding as filters, insulation and roadbed stabilization sheeting.

The non-durable non-wovens are dust cloths, diapers, sanitary napkins, surgical and industrial masks, bandages are made and used.

Decorative fabric construction :

Netting:

Netting comes in different sizes of mesh and in various weights. Nets are the open meshed fabric has geometric shaped figures made of silk, cotton, nylon,polyester, rayon and other man-made fibres. Net fabrics are relatively fragile or delicate and require care while handling and cleaning.

Laces:

The techniques of lace making involves looping, knotting, braiding, Lace making was a domestic art. There are many varieties of Lace Crochet Lace, Darned Lace, Needle point lace, Latting lace, Macramé lace.

Crochet :

It is a simple form of warp knitting usually done by hand. Basically, fabric is made by forming a row of stitches with a length, equal to the fabric, width and then returning along the chain making double crochet stitches by inserting the needle into previous loops. The technique can create open lace like fabric.

Braiding:

Braiding is a simple form of narrow fabric construction. Strands are plaited together by crisscrossing them diagonally and length wise.

Braids are divided into 2 types.

1) Flat braids
2) Round braids

Braids are used as cords, tapes, shoe laces, wicks, parachute and glider cords.

Macrame:

It is created through a technique of knotting, Macrame differs from other laces in texture and appearance. It is generally made of heavy yarn knotted into relatively large designs.

Felting :

Felting was originally based upon the physical characteristics of the crimp and scaly surface of wool fibre that cause them to cling and inter mesh and allow them to be pressed into compact fabric.

In wool felting process, two carding operations make the fibres parallel and of even thickness in the form of a fine web. Several webs may be built up until a sufficient amount of thickness has accumulated.

Wool felts:

Short staple fibres are used for felts. Sometimes blended fibres are also used with wool like cotton, rayon.

Fur felts:

The short fibres of fur bearing animals as rabbit, muskrat. Fur felts are made from mixture of fibres. Fur contributes softness, smoothness, resilience and water repellency.

SUMMARY:

The fabric construction methods deal with different types of fabric making includeweaving, knitting, lace making, felts and non-wovens. Each process varies, based on its structure and techniques involved to produce fabric.

Short answer type questions:

1. What is weaving?
2. List out fabric construction methods.
3. What are the types of warpknitting fabrics?

4. Mention the fundamental stitches of weft knitting.
5. Write down the types of felt.
6. Mention the types of needles used in knitting.
7. What is Jersey knit fabrics?
8. What is Macramé?
9. Define Netting.
10. Write the differences between weavingandknitting

Long Answer type questions:

1. Write in detail on non-woven fabrics and its production methods.
2. What are the differences between woven fabric and knitted fabric?
3. Explain felting and its varieties.
4. Explain (a) Macramé (b) Lace fabrics (c) Rib knit
5. Write about the classification of knit fabrics.
6. How do you identify warp knitting and weft knitting fabrics?

Unit 7

LOOMS

Structure:

Introduction
The Loom
Characteristics of Woven fabrics
Weaves

Learning Objectives:

After studying this chapter, the students will be able to

- List out the parts of the loom
- Understand the various steps in weaving
- Learn about the types of weaves
- Know about variation of plain, twill and satin weaves
- List out the examples of fabrics for the weaves

Introduction :

A fabric is a pliable, plain like structure that can be made into garment and household textiles and for the industrial uses. Fabrics are made from the solutions, fibers, yarns and combinations of these elements with a previously made fabric or cloth. Fabrics are usually available to the consumers by the yards or meters.

Two or more sets of yarns interlaced at right angles to each other to make fabrics are called as weaving.The fabric made of weaving is termed as woven fabric. The yarns running parallel to the length of the fabric are called warp yarns or ends. Those running perpendicular or across to the warp yarns are called weft yarns or picks or filling yarns. All woven fabrics are based on three types of weaves. The three basic types of weaves are plain, twill and satin. These three types of basic weaves can be made on the simple looms without the

use of any attachment. Most of the other weaves are variations or combinations of these three weaves. Weaving is done on machine called Loom.

The Loom:

The principal parts of a Loom whether it is worked by hand or by power are the same. They are :

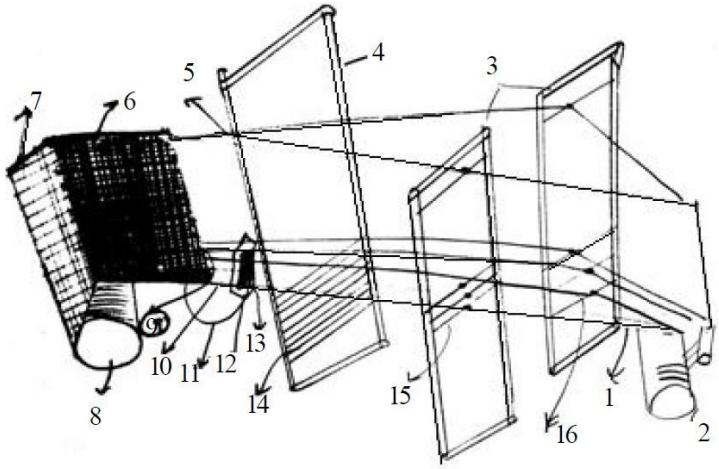


Fig. 7.1 Structure of the loom and its parts

1. Warp yarn
2. Warp beam
3. Harness
4. Batten
5. Reed
6. Selvedge
7. Woven cloth
8. Cloth beam.
9. Fell or edge of the cloth.
10. Shed.
11. Weft.
12. Shuttle.
13. Bobbin.
14. Dent.
15. Heddle.
16. Heddle eye.

Parts of the modern loom:

Warp Beam:

Located at the back of the loom on which with the warp yarns are wound holding the warp yarns between them. The yarns pass to the front of the loom where they are attached to cloth roll.

Harness :

Harness is a frame to hold the heddles.

Heddle :

It is a wire with a hole in the centre the warp yarn goes. There are as many heddles as there are warp yarns in the cloth and the heddles are held in two or more harnesses. The warp is raised and lowered by a harness – heddle arrangement. When the harness is raised shed is formed through which the filling yarn can be inserted.

Shuttle:

It carries the filling through the shed.

Reed or Batten:

Beats the filling yarn into the cloth to make the fabric firm. A reed is set of wires in the frame and the space between the wires are called as dents.

Cloth Beam:

Which is located at the front of the loom nearest to the weaver on which the woven cloth has been wound.

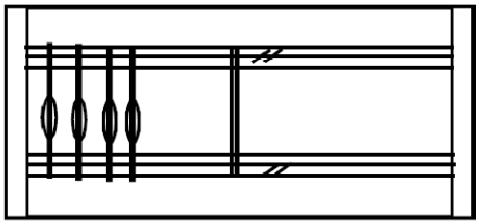


Fig. 7.2 Harness

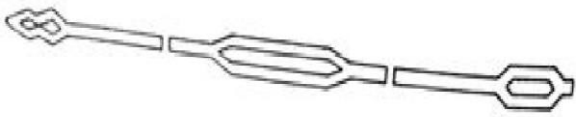
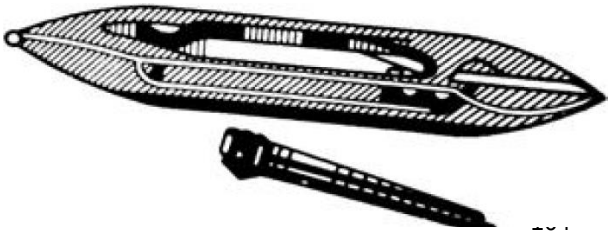
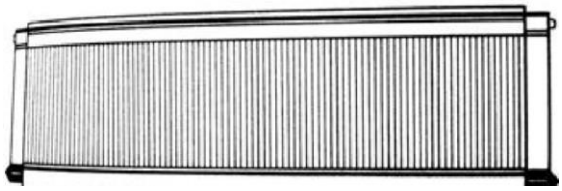


Fig. 7.3 A Heedle





Steps in Weaving:

1. Shedding : Raising one or more harnesses to separate the warp yarns and form a shed.
2. Picking : Passing the shuttle through the shed to insert the filling yarn.
3. Beating up : Pushing the filling yarn into place in the cloth with the reed.
4. Let off : Warp yarns are released from the warp beam so that weaving may be carried out.
5. Take up : Winding of finished cloth on the cloth beam.

Characteristics of Woven Fabrics:
Yarns:

Warp and filling have different characteristics and the fabric performs differently in the warp and filling direction. Stronger yarns are used in the warp wise direction as they undergo more tension and friction than weft yarns.

Most fabrics stretch less in the warp direction. The warp yarns lie straighter in the fabric because of loom tension. They show less crimp. Decorative or special function yarns, yarns with slack twist, yarns with little twist are usually the filling yarns. Warp yarns tend to be smaller, with higher twist.

Grain:

The grain indicates the direction of the warp or weft yarns. Length wise grain is a position along the warp yarns. Crosswise grain is along the filling yarn.

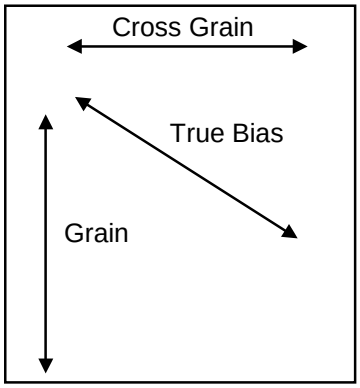


Fig:7.6 Indication of Grain on the Fabric

Fabric count / Thread Counts:

Fabric count or count is the number of warp and filling yarns per square inch of grey goods. Count is written with the warp number first and followed by weft number. Fabric count is an indication of the quality of fabric – the higher the count, the better the quality for any one fabric and less potential shrinkage and less raveling of seam edges.

Balance:

Balance is the ratio of the warp yarns to filling yarns in a fabric. A fabric is said to be well balanced if the number of warp yarns and filling yarns are almost equal.

For example, a piece of muslin with a thread count of 64 × 60 is considered well balanced.

Selvedge:

The lengthwise finished edges where yarns are closely packed are called Selvedges. It is the self-edge of a fabric formed by the filling yarn when it turns to go back across the fabric. The conventional loom has the selvedge on both sides of the fabric. Usually the selvedge can be done in four different ways. Plain Selvedge (Similar to the rest of the fabric), Tape Selvedge (done with larger or pile yarn to give strength), Split selvedge (done for narrow width fabrics after cutting and finished with the machine chain or hem) Fused selvedge (heat sealed edges of ribbon) Selvedges in generally ¼ to 1 inch wide on fabrics.

Fabric Width :

The loom determines the width of the fabric. It is measured from Selvedge to the Selvedge. Hand woven fabrics are generally 27-36 inches wide.

Weave Types:

A weave describes the pattern in which the warp and the weft yearns are interlaced. The weaves are generally classified into Basic weaves and complex weaves.

Plain Weave :

It is the simplest weave having the most basic inter lacing, each weft goes over a warp and then under a warp yarn. It gives the firm flat structure. The fabric looks alike from the face and back and is therefore reversible. Using different coloured yarns in warp and weft direction can create checks and stripes. It is made from a simple loom. Plain weave requires only a two-harness loom. It is the least expensive weave to produce. About seventy percent of woven fabrics available in the market today are woven in plain weave or its variations.

Fig: 7.7Plain Weave

Characteristics of plain weave fabrics:

1. Plain weave fabrics have no right and wrong sides unless they are printed or given any surface finish.
2. Plain weave is made interesting by printing and embossing and for other surface decorations.
3. Fabrics made by tightly twisted warp and loosely twisted weft make it easy for napping finish to be given to it.
   E.g. flannelettes, striped material, plaids etc.,
4. Plain weave fabrics wrinkle more than other types of weaves.
5. Because of more inter lacings these fabrics are very firm and sturdy.
6. These fabrics are less absorbent than other weaves.
7. Plain weave fabrics
   Cotton: calico, cambric, canvas etc., Wool crepe, flannel etc.,
   Silk: Chiffon, georgette, taffeta and voile etc.,
   Rayon: Chiffon, organdy, seer sucker etc., plain weave diagram fig7.7
   .

Variations of plain weave :

Plain weave fabrics have a wider range of end uses. These fabrics can be made in any weight. Plain weave variations are rib weave and basket weave.

Rib weave:

Finer or single yarns are interlaced by thicker yarns or group of yarns to produce this ribbed effect. Sometimes the order may be reversed. Rib weave fabrics are interesting and attractive.

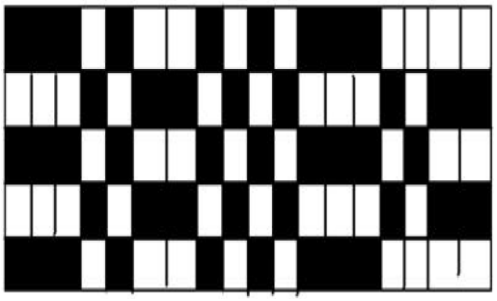


Fig: 7.8 Rib weave

Characteristics :

The method of identifying the rib weave is thick and thin yarns will be found in rib weave fabrics.Eg: Faille gross grain, broad cloths, poplin.

Basket weave :

In basket weave two or more yarns are taken as one. Two or more filling yarns passes over and under two or more number of warp yarns. Like plain weave, Basket weave construction is not very firm and tight.

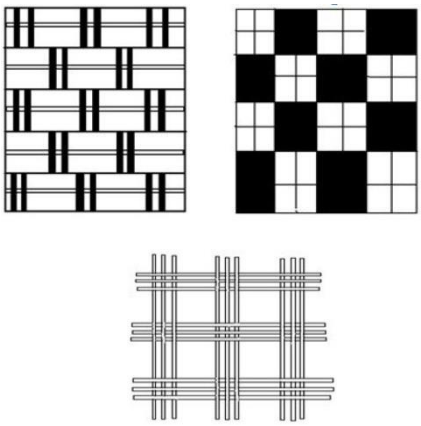


Fig: 7.9 Basket Weave

Characteristics:

1. These fabrics have interesting and attractive surface effects.
2. These fabrics have flexibility and wrinkle resistance because there are few interlacings per square inch.
3. Some of the problems faced by basket weave fabrics are sagging, stretching.
4. Float is more in the basket weave, so the fabrics are soft, porous and lustrous.
5. This weave is used in material for sport coats and suits.
   Examples: Monk's cloth, Oxford cloth.

Twill weave :

A twill weave is characterized by diagonal lines on the face or the back of the fabric. Each warp or filling yarn floats across two or more filling or warp yarns with a progression of interlacing by one to the right or left to form a distinct diagonal line or wale. A float is the portion of the yarn that crosses over two or more yarns from the opposite direction. Twill weaves vary in the number

of harnesses used. Simple twill weave requires 3 harnesses. The direction of twill weave can be varied to create interesting effects such as right-hand twill weave, left hand twill weave, broken twill weave, herring bone.

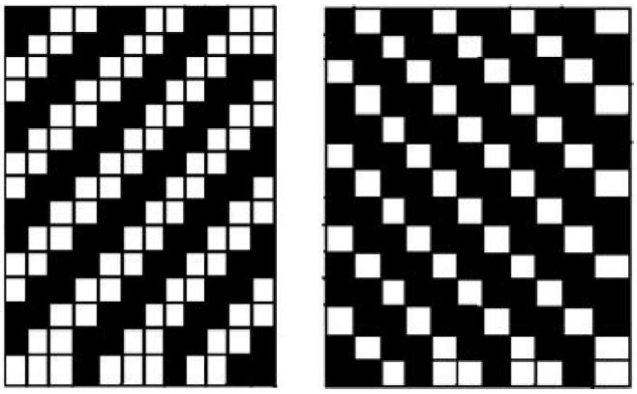


Fig: 7.10 Twill Weave

Characteristics :

1. Twill weave fabrics have a right side and a wrong side.
2. Twill weave fabrics are more durable.
3. These fabrics do not soil easily.
4. They show good wrinkle recovery and are firm, drape well, have more softness.
5. These fabrics are attractive in appearance and are not usually printed.

Examples:Gabardine, Denim, jeans, Khaki ,Table linen, Towels, Blankets etc.,

Satin weave:

The interlacing of warp and filling yarn is irregular. The filling yarn passes under several warp yarns thus throwing up the warp on the surface of the cloth and the filling on the inside or wrong side of the cloth. The gap between the inter lacing are called floats.

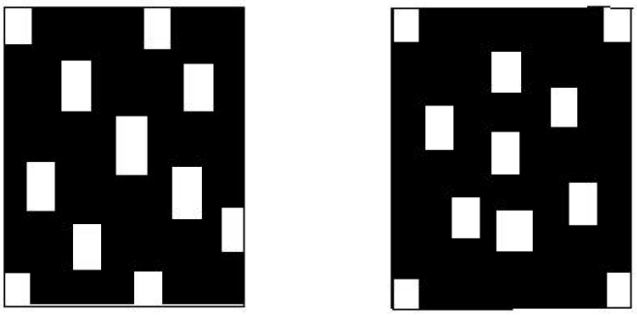


Fig: 7.11Satin Weave

Characteristics :

1. The long warps floats in this weave produce a smooth surface with a characteristic luster.
2. These fabrics have a right or wrong side.
3. Due to abrasion and snagging these fabrics have a greater tendency to wear.

Example: Slipper satin, satin crepe, Faille satin, Venetian Satin etc.,
satin variation is Sateen Weave.

Sateen weave :

It is characterized by filling yarns floats on the surface. These fabrics are generally weaker when compared to satin fabrics.

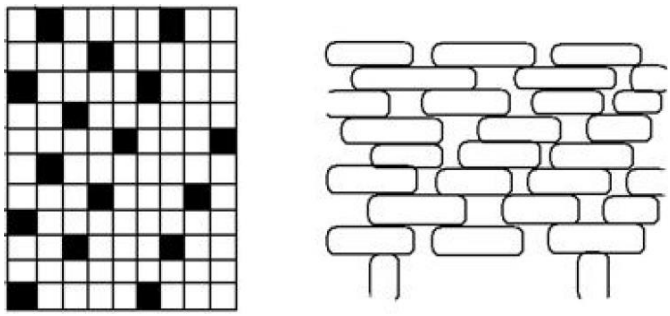


Fig:7.12 Sateen Weave

Characteristics:

1. Sateen fabrics are lustrous fabrics made up of Spun yarns.

2. They are cotton fabrics used for draperies and dress fabrics.

Examples: Damask, Ticking, Single and Double damask.

Novelty weaves:

Complex weaves are also known as decorative weaves. Special attachments in the looms are required to create these weaves. Many fabrics have various types of designs woven into them. There are two methods of making these figure weaves – Jacquard and Dobby. A Jacquard Loom is necessary for

more elaborate patterns but a Dobby attachment is sufficient for simple and small geometrical designs.

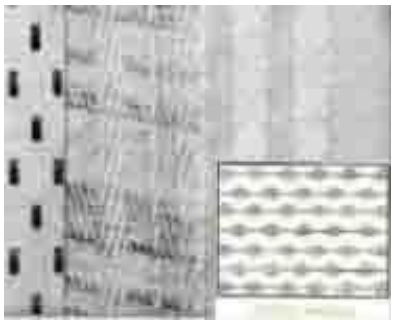


Fig:7.13 Novelty Weaves

The three important weaves are plain weave, twill weave and satin weave. The fabrics made out of these weaves have special characteristics. Plain weave fabrics are more versatile and easily sewable fabrics. Ribbed fabrics are suitable mainly for furnishings and basket weave fabrics are suitable for shirtings and furnishing. Twill weave fabrics are characterized by diagonal lines. These fabrics are mostly used as work clothes and sports clothes. Satin weave fabrics are selected for their luster and for soft draping quality.

SUMMARY:

Plain weave, Twill weave and Satin weave are three important basic weaves. Depending upon the interlacing of yarns these weaves produce fabrics. Each weave has definite characteristics and inherent qualities. Most of the woven fabrics fall in any of these weaves.

Short answer type questions:

1. List out the basic weaves.
2. What are the variations of plain weave?
3. List out the characteristics of satin fabric.
4. Write down two important characteristics of twill weave.

5. How do you recognize twill weave?
6. What is a float?
7. Mention any four parts of Loom.
8. Name the steps in Weaving

Long Answer type questions:

1.Draw a neat labeled diagram of Loom?

2.Explain the steps in Weaving

3.What is weaving? Describe plain weave with neat diagram.

4.Explain about plain weave variations

5.Elaborate twill weave with the specific characteristics

6.Describe Satin weave in detail and its variation.

7.Write any four characteristics of woven fabrics.

Unit 8

Stains

Structure:

Introduction
Classifications of stains
General rules to be observed in removal of stain
Methods and reagents required for stain removal

Learning Objectives:

After studying this chapter, the students will be able to

• Explain the definition of stain
• List out the different types of stains
• Understandthe general rules to observed in removal of stains.
• Knowing about the common stains and reagents required for the removing of stains on various fabrics.

Introduction:

Stain is a spot or mark of discolouration left on fabrics by the contact and absorption of some foreign substance. Some stains are easily removed by ordinary methods or reagents. Some stains need special treatment. This entirelydepends upon the nature of the stain. Stain removal and spotting is a skill which calls for experience and demands special attention. The factors to be kept in mind while removing the stains are

(1) The composition and colour of the fabric
(2) The nature and age of the stain

The stains with their respective removing agents are specified in this chapter.

Classification of Stain :

Stains are classified into different groups. They are (1) Animal stains (2) Vegetable stains (3) Grease stains (4) Dye stains (5) Mineral stains.

1) **Animal Stains :**

These are caused by a Animal products such as blood, egg, milk, meat and juices. As these contain protein matter, heat must be avoided in removing them, otherwise protein matter will get fixed in the stain.

2) **Vegetable stains:**

These include those caused by tea, coffee, cocoa, fruit and wine. These are acidic and therefore require alkaline reagents to remove them.

3) **Grease Stains:**

They may be just grease spots or some colouring matter fixed with grease. These include butter, curry, oil, paint, varnish and tar stains. In removing these stains some grease solvent or an absorbent is first used to dissolve or absorb grease before the removal of the colouring matter. A solvent soap is also very effective for removing these stains from washable fabrics.

4) **Dye Stains:**

They may be acidic or alkaline and so the nature of stain is ascertained before a specific removing reagent is used.

5) **Mineral stains:**

Such as iron mould, black ink and certain medicine stains are compounds of metal and dye. These are first treated by acid reagents to act on the metal and then by an alkaline solution to neutralize the acid reagent and act on the dye.

General rules to be observed in removal of stain:

1) All stains are removed when fresh.

2) Treat known stain with specific reagents.

3) Unknown stains should be treated with simple methods like :

(a) Soak in cold water

(b) Soak in warm water

(c) Bleach in open air

(d) Treat with alkali solution

(e) Treat with an acid solution

(f) Treat with an oxidizing bleach if the above fail

(g) Treat with reducing bleach

(h) In the event of stain persisting, which is unlikely process (d) and (g) can be repeated

4) Chemical reagents and bleaches have harmful effects on wool, silk, synthetic fabrics.If chemical reagents are used specially as animal fabrics they must be in dilute solutions.

5) If the stain still persists, resort to bleaching only when all other treatments fail.

6) The fabric should be in contact with the reagent until the stain is removed.

7) The fabric should be rinsed in water several times to remove the reagent.

8) All acid reagents should be neutralized with an alkaline rinse.

Methods and reagents required for stain removal:

Stain	**Condition**	**White cotton and Linen**	**Silk and Wool**	**Synthetic Fiber**
Beverages (Tea, Coffee, Fruit & Wine)	Fresh Dry	Pour boiling water through (1) spread borax over and pour boiling water through (2) Steep in glycerin until stain is removed. If it still persists	Steep in warm water. Steep in dilute borax solution (1/2 spoon to 2 cups of water) (1) Steep in borax solution. (2) Treat with	Steep in warm sodium perborate solution (1tea spoon – 1 pint) Ditto

		bleach with Javelle water.	dilute hydrogen peroxide.	
Blood (Protein)	Fresh Dry	Soak in cold water and wash in dilute ammonia. Steep in cold water and salt	Sponge with cold water same as cotton. For un-washable fabrics apply starch paste	Wash in cold water
Curry	Fresh Dry	1) Wash with soap and water 2) Bleach in sunlight and air 3) Bleach with Javelle water	1) Treat with solvent soap. 2) Treat with potassium permanganate and ammonia.	1) Wash with soap and water 2) Bleach with sodium perborate
Dye	Fresh Dry	1) Steep in water wash with soap and water 2) Steep in dilute alkali. 3) Treat with alcohol, ammonia and dilute acetic acid. 4) Steep in cold solution of bleaching powder.	1) Treat with alcohol or Ammonia. 2) Bleach with hydrogen peroxide.	1) Wash with water and soap. 2) Treat with dilute bleaching powder solution.
Egg	Fresh Dry	Wash in cold water and then in warm water and soap. Apply salt and pour warm water through	Same as cotton	Same as cotton
Grease oil and Ghee	Fresh Dry	Wash with hot water and soap Treat with a grease solvent and wash with hot water & soap.	If washable same as cotton. For un washable treat with grease absorbent. Spread French chalk or fuller's earth	Same as wool and silk.

			on the stain. Leave it for one-hour Brush off the powder.	
Haldi	Fresh Dry	Same as curry stain	Same as curry stain	Same as curry stain
Ball point ink	Fresh	Swab with methylated spirit using a pad of blotting paper	Same as cotton	Same as cotton
Iron rust	Fresh Dry	Steep in oxalic acid solution and then rinse with dilute borax solution. Steep in solution of salt and Lemon.	Same as for cotton	Same as for cotton
Lip stick	Fresh Dry	Steep in methylated spirit & wash with solvent soap. Moisten and soften by working glycerin into the stain. Rinse and then wash with surf or soap.	Same as for cotton.	Steep in kerosene or turpentine, wash with soap and warm water.
Medicine	Fresh Dry	Steep in warm water. Steep in oxalic acid and wash with borax solution. Steep in methyl alcohol or surgical spirit	Same as for cotton	Same as for cotton.
Mildew (Difficult to remove)	Fresh Dry	Apply soap lather on the stain and cover with French chalk and place in sun to bleach. Bleach with Javelle water.	Same as for cotton	Same as for cotton.
Nail polish	Dry	Apply amyl	Same as for	Same as for

and Varnish		acetate to the stained area with a cotton or wool pad. This must not be used on any acetate fabrics.	cotton	cotton.
Perfume		Treat with ethyl alcohol. Bleach with hydrogen peroxide.	Same as cotton	Same as cotton
Shoe polish		Scrape off the stain if dry. Apply a little grease. Wash with hot water and soap. Steep in turpentine wash with solvent soap.	Steep in alcohol Wash with solvent soap	Steep in kerosene or turpentine and wash with solvent soap
Oil paint varnish		Steep in turpentine wash with solvent soap. Steep in alcohol, wash with solvent soap. Sponge with equal parts of alcohol and benzine.	Same as cotton.	For Rayon alcohol is not used.
Perspiration		Steep in cold water. Steep in dilute ammonia solution. Bleach with Javelle water.	Same as cotton.	Same as cotton.

SUMMARY:

This chapter helps us understanding the stains, the general rules to be followed for removing the stains reagents which are required to remove the stains and different methods for removing the stains from the fabrics.

Short answer type questions:

1. What is a stain?
2. What reagents are required for removing (a) Ball point ink (b) Tar?
3. How do you remove iron rust from cotton fabrics?
4. Write the steps involved in removing the medicine stain.

Long Answer type questions:

1. What is a stain? Explain classification of stains with examples.
2. What are the general rules to be observed in removal of stains?
3. List out any four common stains and their removing agents.

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Unit 9

FINISHES

Structure :

Introduction
Classification of finishes
Mechanical finishes
Chemical finishes
Dry cleaning

Learning Objectives:

After studying this chapter, the students will be able to

- Learn about the different varieties of finishes and their classification.
- To understand the importance of finish for the material.
- To know about bleaching method.
- To know about Dry cleaning.

Introduction:

Fabrics when they come out of loom are not at all attractive. They get dirt during the process of spinning and weaving. In order to clean them, to improve their appearance to bring out distinctive characteristics and to prepare them for market, they are made to undergo certain additional processes, after they have left the loom. The newly constructed goods when come from the loom are called gray goods. Finishing processes are under taken by highly specialized companies called converters. They are three types of converterising organizations.

1. **The true converter:**

They convert the unfinished products into finished consumer goods.

2. **The converter jobber :**

Operates like the true converter but also buys finished fabrics as circumstance may require.

3. **The integrated converter:**

It is a part of a larger company that has a vertical organization the company produces and finishes its own fabrics.

Definition :

Anything which was done to fiber, yarn orfabric either before or after weaving or knitting to change the appearance and performance.

The treatment given to a cloth after it is constructed is called finishing. Finishing improves the appearance, feel, performance of textiles. Finishes have great influence on how the final textile products or garment will perform.

The aims of finishing processes are:

1. To make the material attractive.
2. To improve suitability and utility.
3. To produce variety.
4. To increase the weight of stiffness.
5. To produce imitation.

Finishes are classified into two groups:

1. Mechanical Finishes	**2.Chemical Finishes**
1. Tentering	1. Mercerising
2. Calendaring	2. Bleaching
3. Moireing	3. Shrinking
4. Embossing	4. Degumming
5. Glazing	5. Weighting
6. Napping.	6. Water repellent

Mechanical finishes :

These finishes affect the size and appearance of fabrics. It modifies the fabric thickness and surface. It creates different textures such as smooth and flat look or napped or flocked texture. These finishes are called Dry finishes.

1) Tentering :

The fabric after passing through the process of dyeing or wet finishing gets uneven at the edges. The process of tentering straightening out the edges and the weaves of the fabric and make it even width. The fabric is passed through a frame. A chain on either side of a frame catches the selvedges of the fabric and controls the pulling process for straightening out the material.

Steam coils are arranged underneath the frame and this device dries the material during the process of stretching.This process is used for silk, rayon, wool, cotton.

2) Calendaring :

This is the final process and consists of pressing the material after it has passed through other necessary processes. It smoothens out wrinkles, adds sheen and gives a smooth even surface to the fabric. The fabric is passed between very hot and highly polished rollers. This is called simple calendaring. To increase the lustre the process is repeated for several times. Cotton, rayon, linen and silk are passed through this process as a final finish.

Fig:9.1 Calendaring

Types of Calendaring :

(i) Moireing:

This process produces a watery line effect on the material. The machinery consists of three steam rollers. The top roller is covered with cloth. The material passes between the first and second roller and then under the top roller which rotates at greater speed and passes the fabric heavily and produces desired effect.

Rayon fabrics are generally finished by this process. This finish on acetate rayon is permanent.

(ii) Embossing :

The process of producing a pattern or a design embossed on fabric. The machine consists of two rollers, one of them is covered with cloth and the other is engraved with the design. The cloth covering one of the rollers, is moistened with soapy water. When the machine operates, the impression of the pattern is taken on the covered roller. Then the material is passed through these rollers which are heated by steam. As the material is pressed between the two rollers, it gets the imprint of the design.

(iii) Glazing:

A stiff polished or glazed surface can be obtained by the application of starch, glue or shellac followed by friction calendaring. This process makes the fabric resistant to dust and spots and minimizes shrinkage.

(iv) Napping:

Napping finish is given to woven or knitted fabrics are passed against rotating, bristled wire covered brushes. This action results in fibre actually being raised from the fabric. The overall effect is a fabric with raised fibre surface.

Napped fabrics have a softer hand and provide better insulation than the same materials unnapped because they can entrap more air, hence their wide use in blankets, sleep wear and winter clothing.The

low resilience of these fibers cause premature flattening of the fibre nap. The nap can partially be restored by frequent brushing.

Chemical Finishes:

Chemical finishes are called as wet finishes. These finishes generally affect fabric performance. They enable fabrics to serve the purpose for which they are made.

(i) Mercerization :

It is one of the most important of all cotton finishes. The finish imparts luster to the cotton increases its strength by 25% and improves dye affinity, producing brighter shades than unmercerized cotton. The process consists of impregnating yarn or the fabric with cold caustic soda solution applied under tensions to reduce shrinkage and to increase the luster. The process removes the twist in the fibre and thus causes the fibre to become smooth and cylindrical which produces a silky effect.

(ii) Bleaching :

Bleaching is a chemical treatment given to fibre yarns or fabric to remove paleness or colour and make them white. Suitable bleaching agent such as hydrogen peroxide for protein fibers and sodium hypochlorite for cottons are used. Manmade fibers do not need bleaching. Fabrics have to be carefully bleached as bleach can harm the fabric if used in high concentration.

Bleaching agents can be divided into two classes.

1. **Oxidizing Bleach:** It provides oxygen, which combines with the stain to form a colourless compound.

2. **Reducing Bleach:** Are those, which are capable of removing oxygen from the colour matter in the stain.

3. **Shrinking or Sanforising:**

On the looms the fibers are kept under tension during weaving process. The fibers tend to come back to their natural state causing shrinkage. The yarns are preshrunk by immersion in cold water, hot water, chemical treatment. Any of the above methods permit the

manufacturer to label his product as preshrunk. When the textile fabrics are preshrunk, they are not liable to further shrinkage when washed.

Shrinkage depends upon the type of weave, amount of twist in the yarn, thread count and yarn count.

4. Degumming:

Silk contains sericin must be removed in soap bath to bring out the natural luster and the soft feel of silk 25% of weight is lost by degumming process. A small amount of sericin is sometimes left in the yarn or in the fabric to give finished product added strength or dull finish.

5. Weighting :

Silks are weighted either at yarn stage or at woven stage. It is also weighted during the process of dyeing by adding the weighting substance to the dye. The usual weighting substances used are tin chloride. Fibers absorb these salts and swell. These are not removed by washing, heavily weighted silk has a poor wearing quality. It cracks at the folds and rots with perspiration.

6. Water repellant :

A water repellant is one that will resist absorption and penetration of water for a given period of time, depending upon the length of exposure and the force of water. Penetration of water through a fabric is dependent upon the kind of fiber in the fabric, the tightness of the yarn twist, the compactness of the construction of the fabric and the finish used to discharge water from soaking through the yarns and pores of the fabric.

Additive finishes are applied to give weight, texture, and luster and abrasion resistance to the fabric by application of additives such as starch. the padding is done by passing the fabric through the finishing solution under guide roll and between two padding rolls.

The back filling differs from the padding. It has finish only on one side, usually to the wrong side of the fabric. The surface coating is made with rubber latex, acrylic latex, thermos-plastics and resins. It increases

abrasion resistance serve as a binder give lustre or provide water proofing also.

Dry Cleaning :

Before cleaning, garments are inspected and classified. The length of cleaning cycle is dependent upon the type of the article to be cleaned and degree of soiling.

Fig: 9.2 Dry cleaning machine

Dry Cleaning Machines :

There are various models of dry cleaning machines. All dry-cleaning machines work on the same principle. A dry-cleaning machine consists of four basic components.

- Holding or base tank
- Pump
- Filter
- Cylinder or wheel

"The Dry-cleaning pump" will save petrol as well as give, efficient work. The "Dry cleaning pump" is a round tin with a lid, a tap at the lower side and fitted in suction washer with a handle. The lid is tightened by up means of three screws which makes the tin almost airtight.

When using the tin should be half filled with petrol, the dirty articles placed in and the lid screwed down. The suction washer is worked up and down for 15 to 20 minutes Time depends on the amount of dirt in the garment. At the

end of the process, the tap is opened and the petrol is received in a bottle through a filter paper. Then the lid is unscrewed. The articles removed from the tin and left to air. The whole apparatus should be made of some rust proof metal. A wooden handle to the suction washer is more convenient.

SUMMARY:

Finishing improves and enhances the quality of fabrics. Finishing makes the material more attractive. The consumers are aware about different types of finishes.

Short answer type questions:

1. What is a calendaring?
2. What are finishes?
3. What is tentering?
4. What is mercerizing?
5. Write about calendaring.
6. What is bleaching?
7. What is Napping?
8 What is Degumming?
9 Mention the aims of finishing process.

Long Answer type questions:

1. Explain about different types of calendaring finishes.
2. Explain any four chemical finishes.
3. Write about Dry cleaning.

Unit 10

Fabric defects

Structure:

Introduction:
Major fabric defects
Fabric rating
Fabric inspection methods

Learning objectives:

1. To understand different types of fabric defects
2. To know the criteria for fabric rating
3. To learn about fabric inspection methods

Introduction:

Woven fabrics are produced by interlacing warp and weft yarn at right angles to each other.Faulty woven fabrics hampers the total quality of woven garments such as trousers, shirt, pant, sarees, jackets. These defects affect the serviceability of the fabric and may not suit perfectly the expected end use. Everyone should know about the major common defects as they may not buy such fabrics and also various types of fabric inspection methods and fabric rating.

Major fabric defects are:

- Reed mark
- Broken picks
- Badselvedge
- Brokenpattern
- Broken ends warp
- Thickandthinplaces
- Float of warp
- Defects due to dyeing and printing

1. **Reed mark:**

Reed is the part of the loom. The yarns are pulled through this reed which appear in weaving. In a woven fabric a crack appears on the length of the fabric. It is called reed mark. It may be caused by the wrong drawing-in of the warp or damage to the reed wires. If it is prominent it creates an unsightly look. These fabrics are generally graded as second fabrics.

2. **Broken picks:**

Pick is the filling or weft yarn used in weaving. A filling yarn that is broken in the weaving of a fabric or missing in few places then this defect occurs. Broken pick appears in a portion or in the width of the fabric.

3. **Bad selvedge**:

Selvedge is the finished edge of the fabric. The selvedge width may vary from ¼ to 1 inch. In good quality fabrics the selvedge will be straight and thick. Bad selvedge occurs in fabrics due to faulty weaving. Warp ends are set too far apart for the thickness of the yarn or in finished fabric. Selvedges are loose, narrow, flimsy and crisscross. Then the fabric is said to have bad selvedge.

4. **Broken pattern:**

It is a defect in the woven fabric due to the breakages of yarns in the weaving or finishing. These are commonly found in heavy yarns used fabrics like bed sheet material, drapery curtain material etc. If the yarn is broken to a large extent the motif look will change.

5. **Broken ends warp(chira):**

A warp yarn that was broken during weaving or finishing. This is the most frequently occurring defect in Indian fabrics and constitutes 40-50% of the total fabrics. Most of this caused by broken ends that are not mended immediately. It can be prevented by minimizing missing ends in beam and efficient maintenance of the warp stop motion.

6. **Thick and thin places**:

Fabric count varies more than a specified percentage from the intended count. Thick or thin place is more than one inch wide then it is considered as major defect in fabric grading.

A segment of yarn at least 1/4inch (0.6cm) long that is noticeably thicker than adjacent portions of yarn is called thick place. A segment of yarn at least 25% smaller in diameter than adjacent portions of yarn is called thin place.

7. **Flat of warp**:

If someone pulls the fabric from the cloth roller intentionally or un intentionally then this kind of defect is produced in woven fabric. It is a long un bound or un interlaced yarn left loose on a fabric. Since the yarns are not interlaced the fabric strength will be less. Such fabrics are graded as seconds.

8. **Defects due to dyeing and printing**:

Dyeing is a process of imparting colour to the fabric, while dyeing if the temperature is not maintained properly, if excess chemicals added or proper stirring is not there then uneven shading, dark spots or specks of colours occur on the fabric. This defect will not look good. Printing is the process of imparting designs on a fabric. Printing is done in several ways. Printing defects such as mis print, un even printing, colour stains, dark and light colour print places occur due to improper printing. These defects are easily visible and will spoil the beauty of the garment.

Fabric Rating:

A minimum 10 points are charged for one linear yard of fabric. The total penalty points do not exceed the total yardage of the piece. The piece is graded as First" quality.

A Piece is graded as "Second" the total penalty points exceed the total yardage of the piece.

In finished garment inspection method, total defect points per square yard of fabric are calculated and the acceptance criteria are generally not more than 40 penalty points. Fabric rolls containing more than 40 points are considered seconds.

Fabric inspection method:

Fabric inspection methods are two types. They are

1. 10-point system-used for fabric inspection (un-finished)
2. 4-point system-mainly used for finished garments

Fabric Inspection (un-finished):

10 point system:

High quality garments, need high quality piece goods. A sewing factory received fabric from the mill it is difficult to conduct a full 100% inspection of the fabric. So minimum 10% inspections of all piece goods prior to spreading the fabric. There are several methods of fabric inspection in garment industry. The 10-point method is a point per fault system, which gives a measurable guide to quality grading per roll. In 1955" S Ten points" piece goods evaluation was adapted by the Textile Distributors and National Federation of Textiles. The system assigns penalty points to each defect as per following guide line.

Warp defects:

Size defects →→→→→ Penalty
Up to 1 inch →→→→→1 point
1 to 5 inches →→→→→3 points
5 to10 inches →→→→→5 points
10 to 36 inches →→→→→10 points

Filling/Weft defects:

Size of defects →→→→→ Penalty
Up to 1 inch →→→→→1 point
1 to 5 inches →→→→→3 points
5 inches to half width→→→5points
Half to full width →→→→→10 points

A minimum 10 points are charged for one linear yard of fabric. The total penalty points do not exceed the total yardage of the piece. The piece is graded as" First" quality.

A Piece is graded as "Second" if the total penalty points exceed the total yardage of the piece.

Finished Garments-Quality Inspection:

In Apparel industry the inspection can be defined as the visual examination of raw materials (like fabric. sewing, buttons, trims etc.). It is an important aspect to follow prior to garment manufacturing to avoid rejects due to fabric quality and facing with un expected loss in manufacturing. We inspect 10% of the rolls. We receive and evaluate them based on a four-point system. This four-point system is widely used for finished garments.

Four point system:

The four-point system also called the American Apparel Manufacturers Association (AAMA) point-grading system for determining fabric quality iswidely used by the producers of apparel. This is endorsed by the AAMA as well as the ASQC (American Society of Quality Control). Defect can be either in length or width direction the system remains the same. Only major defects are considered. No penalty points are assigned to minor defects.

One should inspect at least 10% of the total rolls in the shipment and make sure to select at least one roll of each colour way. Fabric defects are assigned points based on the following:

Size of defect	**Penalty**
3 inches or less	1 point
Over 3 but not over 6	2 points
Over 6 but not over 9	3 points
Over 9 inches	4 points

Total defect points per square yard of fabric are calculated and the acceptance criteria are generally not more than 40 penalty points. Fabric rolls containing more than 40 points are considered seconds.

The formula to calculate penalty points per 100 square yards is given by

$$= \frac{\text{(Total points scored in roll x 3600)}}{\text{Fabric width in inches x Total yards inspected}}$$

Point system of Grading:

The major considerations in grading are the frequency and seriousness of the defects. Before any point values can be assigned to the defects, these two factors must be clearly described. The degree of seriousness of a defect is determined by the intensity and size of length. The intensity determines whether the cutter will see the defect or not, and if so, whether he will cut it out or allow it to remain and cause a defective or second quality garment. The length of a defect also affects the obviousness of a defect, but more important it determines how many panels or garments may be affected. Therefore, the length is of greater importance than intensity.

The simplest possible system that will include both factors is to use basic categories.

A. **Intensity**:

1. Minor: obvious defects
2. Major: very obvious defects

B. **Length**:

1. Short: up to 6 inches long
2. Long: 6 to 18 inches long

In order to place the defects in their proper perspective and at the same time to keep the numerical values as low as possible.

Table : Point system of Grading Defects

Length of defect	Minor	Major	Critical
Short (0 to 6 inches)	1	2	6
Long (6- 18 inches)	3	4	12

A warp wise major defects over 12 inches in length are automatically classified as critical defects and assigned 12 points.

Another Point System of Grading:

Length of Defect	Points
0-3 inches	1
3-6 inches	2
6-9 inches	3
9 inches and over	4

By using another point system of grading, no one-linear-yard of 40-inch width would be penalized more than 4 points. The reason for this is that a 4-point defect by itself would render the yard. Practically worthless, and to assign further points would uselessly penalize the average for full piece.

One disadvantage of the point system of grading is that it merely places an upper limit upon the defects and does not specify any definite distribution of defects. For example, first quality fabric from a mill producing 10 percent seconds will have more defects per piece than the same fabric from a mill producing only 5 percent seconds.

Major defect:

A defect that could be repaired in the gray so that it would not be obvious in the finished product.

Minor defect:

A defect that can be corrected in gray or will be covered in finishing so that it will not be detected in the finished fabric.

After the inspection is completed, the piece of roll is classed by the inspector according to the number, frequency and magnitude of the defects. At this point in the operation, the flow of the fabric varies with different mills. In some mills, all of the fabric is conveyed immediately to the cloth storage area where it is placed in bins according to style, width, quality designation, ultimate destination and so forth. In other mills all second quality fabric are inspected by the head grader to make sure that the piece is actually second quality. One very effective common practice is to have the superintends, over sees of weaving and

spinning and the quality control manager to inspect all seconds to observe the cause of the off-quality so that the necessary corrective action can be taken to prevent or reduce re occurrences.

Summary:

Some of the fabricswith defects are available in the market. So, everybody should gain knowledge of how to identify major defects in fabric. Different types of fabric inspection methods and fabric rating are also included.

Short Answer Type Questions:

1. What is major defect?
2. What is minor defect?
3. Explain 10-point system?
4. Explain 4-point system.
5. List out common defects.
6. Write the causes of reed mark defect.
7. Explain the causes of broken picks defect.
8. Explain the causes of broken ends warp.
9. Explain the causes of broken pattern defect.
10. Explain the thick and thin places defects.
11. Explain the causes of float of warp defect.
12. Explain about defects due to dyeing and printing.
13. Explain the causes for bad selvedge defect.

Long Answer Type Questions:

1. Explain in detail about fabric inspection methods.
2. Describe about point system of grading.
3. Explain any four major fabric defects.

Bibliography:

1. Textile fibres and their use-Hess
2. Fundamentals of textiles and their care-Susheela Dantyagi
3. Household textiles and laundry work-Durga Dulekar
4. Modern textiles-Dorothy Lyle
5. The standard hand book of Textiles-AJ. Hall
6. Introduction to Textiles-E.E.Stout
7. Clothing for modern-Erwin and Kichener
8. Hand book of Textile Testing and Quality control by Ellot. B. Grover and D.S. Hamby
9. Textiles Fibre to Fabric by Dr. Bernard P. Corbman
10. CBSE, NIFT class XII Text books
11. Internet (www.textile school.com).

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COMMERCIAL GARMENT TECHNOLOGY

Paper - III

GARMENT CONSTRUCTION

INDEX

Unit 1

TAKING BODY MEASUREMENTS

Structure:

Introduction

Points to be considered while taking body measurements

Measuring techniques

Tools useful for taking body measurements

Body measurements for women, men and children

Some additional measurements required for children

Procedure for taking measurements

Measurement chart

Learning Objectives:

After completion of this unit, the student will be able to:

- Understand the importance of body measurements
- Know about the points for taking accurate measurements
- Learn taking body measurements for children, men and women
- Take and record measurements as per measuring chart

Unit Preview:

A garment fits well if it is stitched well. Stitching will be perfect if the pattern is cut well. Patterns are made with body measurements. Hence the first step in sewing the right sized garment is to start with a complete and accurate set of bodymeasurements.

Introduction:

Accurate body measurements play a vital role, for obtaining best results in fabric construction. Besides good fitting, correct measurements can also contribute towards saving time in constructing a garment. Personal measurements are required not only for stitching the garment at home, get it

stitched but also for buying readymade garments. Taking body measurements is a responsible task which should be undertaken with great care. It is important for a dress maker to have adequate knowledge about correct methods of taking and recording for it and other important equipment to be considered in taking the measurements.

Points to be considered while taking body measurements:

1. A good quality tape should be used for taking body measurements.
2. The long metal end of the tape is used for taking vertical measurements and the rounded metal end is used for taking horizontal measurements.
3. In a natural pose, preferable in front of the mirror, person giving body measurements should stand straight.
4. While giving the measurements, well fitted garments should be worn.
5. Another person is needed to take measurements.
6. While measuring body parts, basic lines of the body are to be taken into consideration.
7. A cord or tape is fastened around the waist and left until all measurements have been completed before body measurements are taken.
8. While taking girth measurements like bust, waist, hip etc, the tape should be kept parallel to the ground.
9. Exact waist line location gives the accuracy of several measurements. Add to these measurements the suggested amount of ease.
10. Ease differs with the type of fabric used, more ease is needed for woven fabrics than knitted fabrics.
11. To make the measurements more systematic a proper order or sequence should be followed.
12. According to the wearer's preferences, the measurements will be taken depending on the style of the garment.

Measuring techniques:

- Keep the measuring tape comfortably snug but not tight.
- Allowance will be added according to that fit that you choose.
- Persons should not feel restricted by the tape, for a comfortable fit, you should be able to put your index finger inside the tape.
- Allow breathing movement.
- First take cross wise measurements followed by length wise measurements.
- Measurements should be noted down carefully in the chart.
- Don't let the person bend down while taking body measurements.

Tools useful for taking body measurements:

- A fabric measuring tape
- Assistance to record measurements
- Pen, pencil, note book

Body measurements for women, men and children:

The body measurements for men and women are alike. Children's growth or development is very rapid in their childhood period. Measurements for the children change rapidly. So, every time measurements should be taken before constructing a garment. The measurements for both boys and girls are same up to 5 years. With the increase in age, the measurements differ. After 6 years, separate measurements are to be taken for boys and girls. Usually chest, waist and hips are measured.

Some additional measurements that are required for children:

Thigh Girth:

Measure around the fullest part of the thigh. This measurement is useful to draft a pattern for girl's bloomer, short pants, parallels, pyjamas etc.

Cervical Height:

Measure down from the nape of the neck to the ground. This gives the total length of the garment.

Crotch Length:

Pass the tape from the centre back (start at the waist level), in between the legs and to the centre front at the waist level.

Frock length:

Measure from the nape of the neck to the desired length of the frock as per the design.

Chest:

Similar to the 'bust measurement' in the measurement chart.

Procedure for taking measurements:

Bodice measurements:

1. **Neck**:

This is a round measurement taken around the base or the largest part of the neck. Pass the tape around the neck over the collar bone in the front and the base of the neck at the back. This measurement gives the neck width and is needed for a close-fitting collar.

2. **Shoulder**:

This point can be located by feeling for the end of the flat bone at the end of the shoulder, or by raising the arm until a dimple appears at the end of the shoulder and feel for the shoulder bone in this depression.The distance between the base of the neck and the end of the shoulder gives this measurement.

3. **Shoulder width/back width**:

Measure from one end of the shoulder bone to the other at about 4" below the back neck.

4. **High chest measurement**:

This measurement will help in getting a close fit under the armpit, eliminating the wrinkles. Place the tape straight under the armpits in the front and across back to get this measurement. Take care to keep the tape parallel to the floor both at the front and at the back.

5. **Bust**:

Measure around the fullest part of the bust with the tape held parallel to the floor. Do not let the tape sag at the back. The tape should be tight enough so that it does not slip and loose enough, for one finger to pass through.

6. **Waist**:

It is essential to locate the natural waist first, in order to take this measurement. The natural waistline is located above the hip bone in the

narrowest part of the body. A cord tied at the waist, will facilitate in taking this measurement. Measure around the cord with the tape held parallel to the floor.

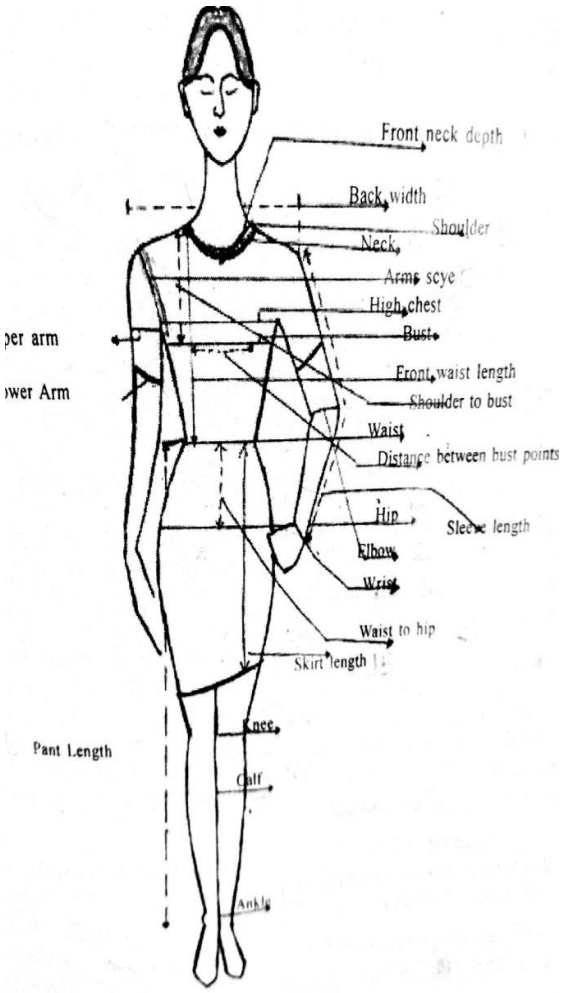

Fig:1. Measurement procedure\

7. <u>High Hip</u>:

At round 3” below the waistline, hold the tape around the hip to get this measurement.

8. <u>Hip</u>:

Measure around the fullest part of the hip(7” from the waistline) with the tape held parallel to the floor.

9. <u>Armscye/Armhole</u>:

Measure by passing the tape under the armpit and around the armhole.

10.Front waist length:

Measure down from the highest part of the neck over the fullest part of bust to the waist.

11.Shoulder to bust:

Measure down from the highest part of the neck to the tip of the bust. This is also called bust point height. This is useful in locating the bust point while drafting a blouse.

12.Distance between bust points:

A horizontal measurement that measures the distance between the bust points, useful for dart placement in blouse drafting. This is also called bust point width.

13.Back waist length:

Measure down from the highest part of the neck over the centre back to the waistline.

14.Front neck depth:

Measure across from the highest part of the neck diagonally towards the centre front.

15.Back neck depth:

Measure across from the highest part of the neck diagonally towards the centre back.

Sleeve measurements:

16.Upper arm:

Measure around the fullest part of the biceps with one finger underneath the tape.

17.Lower arm:

Measure around the bottom or at the lower edge of the sleeve.

18.Elbow:
Measure around at the elbow of the arm.

19.Wrist:

Take a round measurement at the wrist level of the arm.

20.Sleeve length:

The length of the sleeve varies from one style to another. For short sleeves, measure down the arm, from the tip of the shoulder to the desired level. For full length sleeve, bend the arm slightly at a 90^0 angle and measure from the tip of the shoulder down to the elbow and then on to the wrist.

Skirt measurements:

21.Waist to hip:

Measure from waist down to the fullest part of the hip.

22.Skirt length:

Measure from waistline down to the desired length as per the garment design.

Pant measurements:

23.Pant length:

Measure from waistline down to the desired length of the pant.

24. Inseam:

Distance from the innermost part of the thigh to the ankle or the length of the pant.

25. Leg circumference:

a. Thigh:Measure around the fullest part of the thigh.
b. Knee: Measure from the waist to the knee.
c. Calf:Measure around the calf muscle.
d. Ankle: Measure around the ankle.

26. Crotch depth:

After sitting on a hard flat surface, measure down from the waist to the flat surface along the side seam.

27. Crotch length:

Measure from front waistline to the back waistline by passing the tape in between the legs.

a. **Measurement chart**:

A measurement chart lists down all body measurements and helps in recording the same in a specific order.

Measurement chart

Parts of the body	Measurement (inches)
I Bodice measurements	
1. Neck	
2. Shoulder	
3. Shoulder width/back width	
4. High chest measurement	
5. Bust	
6. Waist	
7. High hip	
8. Hip	
9. Armscye/Armhole	
10.Front waist length	
11.Shoulder to bust	
12.Distance between bust points	
13.Back waist length	
14.Front neck depth	
15.Back neck depth	
II Sleeve measurements	
16. Upper arm	
17. Lower arm	
18.Elbow	
19.Wrist	
20.Sleeve length	
IIISkirt Measurements	
21.Waist to hip	
22.Skirt length	
IVPant measurements	

23.Pant length	
24.Inseam	
25.Leg circumference	
a. Thigh	
b. Knee	
c. Calf	
d. Ankle	
26.Crotch depth	
27.Crotch length	

Summary:

Accurate measurements are required for a well-fitting garment. Certain precautions must be taken while taking measurements. Hold the tape easily snug and not too tight or too loose. Do not let the tape twist while taking measurements. It is faster to take crosswise measurements first followed by lengthwise measurements. Record all the measurements taken in the chart so that correct measurements will lead to a well fitted dress.A well fitted garment compliments the body. Sewing such garment dependson the right sized pattern. Patterns are drafted as per individual body measurements. So, body measurements play an important role in the fit of the garment.

Short Answer Type Questions:

1. List out the tools used for taking body measurements.
2. Write the steps for taking sleeve measurements.
3. State what are the measurements required for a pant.
4. State the measuring techniques while taking body measurements.

Long Answer Type Questions:

1. Explain the points to be considered while taking body measurements.
2. Explain the additional measurements required for children.
3. Write about measurement chart for recording measurements.
4. Explain about process of taking bodice measurements.
5. Explain the steps for taking skirt measurements.

Unit 2

Types of Materials

Structure:

Introduction
Basic concept of fabric
Woven fabric
Commonly available fabrics in the market for children's garments
Supportive Fabrics-Lining, under lining, inter facing and inter lining
The importance of selection of material and supportive fabrics.

Learning Objective:

After studying this unit, the student will be able to

- Get the working knowledge of fabrics and their suitability for different purposes.
- Recognise and identify the various types of fabrics available in the market.
- Various types of supportive fabrics- Lining, under lining, inter facing and inter lining.
- Aware of the importance of selection of material and supportive fabrics.

Unit Preview:

Every new season brings new fabrics, colours, silhouettes and styles. A designer must be aware of fashion fabrics available in the market. One must choose fabrics based not only on the current market trends but also on its appearance, comfort, durability and maintenance of the finished garment.

Introduction:

Selection of material isa difficult task for a novice, as there are lot of fabrics to choose from the market. Knowledge of common fabrics helps in

selection and identifying and choosing the fashion fabrics available in the market.

Matching the fabric to the design/style of the garment is second most important thing as it has impact on the final garment made. The various aspects of the fabric like colour, texture, weight and price must also be considered during fabric selection.

In addition to these, fabric quality and suitability to the design should also be thought of, as it affects the garments appearance, durability and comfort features in the finished garment.

Basic concept of fabric:

The basic unit of a fabric is fibre. A fibre is the smallest visible unit of textile product. Fibres make up yarn. Yarn makes up fabrics. Fibres can be natural and manmade. Natural fibres include cotton, jute, wool, silk. Manmade fibres include polyester, acrylic, rayon, spandex. Yarns are produced by spinning or twisting of fibres. Yarns are either interlaced in woven fabric structures or inter looped, knitted, crocheted fabric structures.

Fabrics made in a variety of ways-weaving, knitting, crochet, non-woven fabrics, felts, laces. The two basic methods of producing fabrics are weaving and knitting. In non-woven and felts, fibres are used to make fabrics. Adhesive pressure and temperature are other variables involved in making felts. Fabrics can be made with fibre or several fibres can be blended. Ex: Polyester-cotton blends are commonly available in the market.

Woven fabric:

A woven fabric is made from two sets of yarns-warp and weft. The length wise yarns are called warp and width wise yarns are called weft. Both these yarns have distinctive characteristics. They are interlaced at right angles and a variation in interlacement adds to the diversity in fabrics. Different types of woven fabrics are plain, rib, basket, twill, satin, sateen and herring bone. Plain, twill and satin are the most basic weaves.Some common fabrics are calico, poplin, denim, linen, corduroy. Woven fabrics are available in a variety of weights. Light weight fabrics are suitable for skirts, blouses, dresses, shirts and jackets. All woven fabrics have a selvedge, where in the weave is compact and close. The looser the weave, the more they fray. Loosely woven fabrics are less

durable when compared to firmly woven ones. The choice of the fabrics thus depends on the type of garment being made.

Knitted fabric:

A knitted fabric is made by inter looping only one yarn. Different ways of interlopingproduce different knits-warp and weft knits. The most important feature of knit is its ability to stretch. So, knits are preferred in sportswear and intimate apparel.

Types of fabrics

S.No.	Type	Fabrics
1.	Light weight	Chiffon, crepe, voile, lawn, organdie, georgette, muslin, cambric and other types.
2.	Medium weight	Cotton, flannel, corduroy, wool.
3.	Heavy weight	Denim, drapery and upholstery fabrics.

Commonly available fabrics in the market for children's garments: Fabrics are available in a variety of weaves, fibre contents and weights.
Some of the commonly available fabrics in the market.

Brocade:

A figured fabric in which the figure is developed by warp threads, in relief against a background. It is made of variety of fibres and often in metallic threads forming a raised pattern. Depending on the weight of the fabric it may be used for clothing or upholstery.

Chambray:

This is a checked pattern fabric in which the patterns are formed by the use of coloured yarn in warp and natural or white filling. This has also a mottled effect. There are endless variations of this fabric, such as stripes and satin stripes. Many novelties are available in the market.

Corduroy:

This is a ribbed pile fabric with a high, soft lustre. Pile is made with extra filling threads or extra warp threads, which form loops or floats over the ground threads during weaving. After weaving, the loop threads are cut on a special machine. Then threads are brushed, forming a pile. This is suitable for casual clothes and sportswear.

Crepe:

This is light weight fabric of silk, rayon, cotton, wool, synthetic or a combination of fibres. It has a pebbly or wrinkled surface produced by the use of special crepe yarns. It can be crepe or plain weave. Crepe effects can also be obtained by chemical treatment and embossing.

Chiffon:

Originally a very light, sheer, transparent, open-mesh fabric made from silk, rayon or blend of fibres woven in plain weave.

Casement cloth:

A light-weight to medium weight fabric of cotton or manufactured fibre yarns. It is weft faced and is used for curtains.

Cashmere:s

It is the under coat of the Cashmere goat. It is extremely soft and warm. It is used in men's and women's scarves, sweaters and robes. It is also high priced.

Dobby:

These fabrics woven on a dobby loom. All fabrics have small figures such as dots and geometric designs, very small floral patterns woven in the fabrics. Fabrics are used for shirting, towels, diapers cloth, woven border sarees, drapery and upholstery fabrics.

Drill:

A durable fabric of medium weight usually woven on a three-harness loom. They are also warp face left hand twills made of sheeting yarns, which

comes in various weights and thread counts. It is a2/1 twill construction when dyed, it is known as khaki ticking.

Damask:

This is a figured fabric made with one warp and one weft in which, generally warp satin and weft sateen weaves may be introduced. This is lighter and flatter than brocade and has a high lustre. It is used for dresses and suits.

Denim:

It is a sturdy cotton twill fabric characterised by indigo dyed yarn traditionally for the weft and natural yarn for the warp. In recent years this versatile fabric has been bleached, stone washed, acid-washed, over dyed. Traditionally a 3/1 warp faced twill fabric and more recently, other weaves have been used in lighter construction.

Georgette:

A fine, light-weight, open texture fabric usually in a plain weave made from crepe yarns.

Gingham:

A plain weave, light weight cotton fabric, approximately square in construction in which dyed yarns or white yarns form small checks or narrow stripes.

Flannel:

A full napped woven fabric is generally made of wool yarns in plain or twill weave with a soft handle. Usually woven with a twill weave, which may be obscured by the nap. Distinguished for its softness and it is used for bath robes, skirts, men's suits trousers. Wool napped fabrics are called flannel while cotton napped fabrics are termed as flannelette.

Gabardine:

A regular and steep angle warp face twill weave fabric made of corded or combed cotton, rayon or worsted yarns. Twill is to the left if made with all single yarns and to the right when ply warp and single filling yarns are used.

Jersey:

It is smooth, plain knit fabric of wool, cotton, rayon or synthetic blends, usually jersey has a dull surface and excellent draping qualities.

Lawn:

Thin fabric with plain weave, made of fine closely woven yarns that are slightly crisp and crease resistant. This is available in white, bold colours or prints. It is used for infant's wear, children's wear, lingerie and women's wear.

Oxford:

This is a fabric of plain basket weave of medium or heavy weight. It is woven in varieties of cotton, rayon or polyester/cotton yarns, with heavier filling than warp yarns. Usually these are mercerized. A number of variations of this weave are in the market for shirtings, dresses and similar purpose.

Supportive Fabrics-Lining, under lining, interfacings and interlining:

Lining:

Garment made from sheer/ light weight fabrics require a lining material. It is duplicate of the outer garment which is finished separately and attached to the outer fabric, to the wrong side. The functions of linings are:

- To add more body to the outer garment
- Supports the outer garment
- Add to durability of the garment
- Gives a better drape to the garment
- Can also give an attractive inner finish
- Can help eliminate static in the outer garment

  E.g.: polyester dresses are generally lined to prevent static build up.

Garments can be either fully lined or partially lined, completely or partially attached to the garment. Linings will lengthen the life of garment. It can also eliminate the need for under garments like a slip in a dress or skirt. A separate seam finish is generally not given to the outer garment when it is lined.

The lining fabric should be durable, opaque, colour fast to perspiration and use the same care method as the fashion fabric. Lining should match with the

colour of the outer fabric. The surface and texture of lining should be smooth to permit the garment to be taken on and off the body easily.Various fabrics suitable for lining are voile, cambric, poplin, satin and crepe.

Under lining:

It is a supportive lining fabric that is attached to a major garment piece. Ex: Jacket front, Jacket back, sleeve etc. It prevents bagginess and pulling along the seamlines. The underlining and fashion fabric functions together as one piece throughout the garment construction process. The purpose of underlining is:

- Supports and gives shape to the fashion fabric
- Prevent sagging and stretching
- Adds crease resistance
- Provides evenness of colour for a sheer outer fabric
- Helps to create decorative fashion details

Under lining should be pre-shrunk and cut on grain or the same grain as that of the outer fabric.

Inter lining:

It is a separate layer of fabric or fabric construction between the lining and the fashion fabric. It adds warmth.

Inter facing:

It is an integral part of a garment.It is a layer of knitted, wovenor non-woven fabric placed between the outer garment and facing. An interfacing improves garment appearance and preserves its shape. It also reinforces and adds body to the garment. Inter facings usually used for the front opening having buttons and button holes, collars, cuffs, waist bands and pocket flaps. Fusing often stiffens the fabric, so selecting a fusible interfacing, use a light weight one than that of the fabric. For creating decorative effects, one can use a heavier interfacing. A fusible interfacing used by tailors are called collar fusing.

The importance of selection of material and supportive fabrics: Selection of material is a vital part in dress making and designing.

Numerous factors are to be considered while selecting material. Some of them are:

Fabric quality:

Good quality material lasts longer and wears well.

Durability: Durable material will improve the life of the garment

Hand:

The feel of the fabric is hand. This is largely a personal choice and to some extent governed by the latest fashion trends.

Texture:

Refers to the weight, body and drape of the fabric. Again, dictated by the current fashion trends.

Colour:

Dictated by the fashion trends or colours popular in a particular season.

Price:

The deciding factor as it adds to the final cost of the garment.

The following factors should be kept in mind while choosing supportive fabrics:

- Type of fashion fabric (weight, fibre content/method of care, hand or 'feel', personal likes and dislikes)
- Type and style of garment
- Type of lining-partial or complete and how the lining will be attached.

Summary:

Fashion dictates the silhouette or shape of the garment. The silhouettes change with each season. A garment silhouette can be shaped as per the fashion by using appropriate fabrics that are 'in' for that season and corresponding supportive fabrics. The supportive fabric selected should be compatible with the fashion fabric.

Short Answer type questions:

1. What are the differences between lining and underlining?
2. Define the term inter facing and list the areas in a shirt where interfacing is used.
3. What is a non-woven?
4. What is felt?
5. How is muslin used in garment construction?
6. What is selvedge?
7. Differentiate between warp and weft.
8. What is the difference between interfacing and interlining?
9. List two fabrics suitable for lining and interfacing.
10. What are the factors that one should keep in mind while selecting supportive fabrics?
11. What are light weight fabrics?
12. What are medium weight fabrics?
13. What are heavy weight fabrics?

Long Answer type questions:

1. What do you mean by lining? Explain the purpose of lining. Suggest suitable lining for child's frock.
2. What are different fashion fabrics available in the market?
3. What isunderlining? State the purpose of underlining.
4. Differentiate between lining, underlining, interfacing and interlining.

Unit 3

Selection of Material for various Garments

Structure:

Introduction

Categories of children's garments as per age

children's garment classification

Requirements of children's clothing

Various materials suitable for children's garments

Learning objectives:

After studying this unit, the student will be able to know that

- Children's garments can be categorized into different ways
- Classification of children's garments
- Requirements for children's clothing
- Various materials suitable for various children's garments like Jhangia, Jabla, Romper, A-line frock, Baby frock with bib
- Be aware of the decorative and safety considerations in children's clothing

Unit Preview:

Clothes communicate and have a visual appeal. Clothes contribute to children's self-worth. Family, peer and media have a considerable influence on children's clothing choice. Good clothes instil confidence in the child, which has a positive impact on child's behaviour.

Introduction:

Clothing is one of the five basic needs in every human life. Clothing protects our body from various climates. Clothing also plays an important role in social interaction between the individuals. So, choice of material is dependent upon the garment type and purpose of use.

With the economy, technological and social advancements, the present day children have gained enormous exposure and knowledge.

Societal and economic changes such as nuclear families with only one or two children and increased disposable income of both working parents have significant impact on rearing the children.

The faster pace of life, where working parents are forever running against time, had certainly a direct effect on children's life styles. Specially, stores are also catering to the needs of these little children. Some of the major influences on children's wear can be attributed cartoon networks. Media, social networking sites like face book, twitter, online shopping and peer groups have made children more aware about fashion trends and styles.

Children's apparel category is different from men's and women's wear because childhood is the rapid developmental stge. The changing body shape of the child girl/boy grows and the basic requirement at different stages of this growth must be well understood before designing or creating a suitable garment for the child.

Categories of children's garments as per

age: Children are classified according to their

age

- Infant (birth to one year)
- Toddler (1 to 4 years)
- Preteens (5 to 12 years)

Infant(birth to one year):

Infants from 3 months to 1 year come under this category. An infant weight, head size and age are the major criteria to consider while selecting a garment. The head size of a small child is one fifth of his height, while for an adult child it is one eighth of the body height. At this age, children out grow their clothes as they grow fast. So clothing should be selected with the short term use in mind. Basically, the mothers prefer big size garments. Garment selection should be according to the use, season and purpose. Soft absorbent materials that are light in weight should be selected.

Fabrics like flannel, jersey, knits, polar, fleece in cottons and other fibres are selected for infants. These are soft in hand feel and provide

comfort to the tiny wearer who has sensitive skin, subtle, pastel colours with polka dots, nursery prints, checks are preferred. Solid colour fabrics are also in huge demand for garments. Trims used in infant's garments are less complicated and easy to handle like Velcro, snap buttons, soft laces etc. Over the past years, a huge market for branded clothing for this age group in India.

Toddler (1-4 years):

Children belonging to the age group of 1 to 4 years. At this stage, child develops basic motor skills and becomes physically more active. Due to their energetic behaviour and rapid growth, the fabrics preferred for their garments are from easy to care and maintain category. The preferred fabrics are cambric, poplin, corduroys, light weight, denim, jersey, knits etc.

Fabrics with bright colour palates are usually selected for this age group. Printed and woven fabrics of checks, stripes, polka dots become high light for toddler clothing. The cloths should be light in weight but should give warmth, soft, smooth, fabric which do not called soil and dirt would be ideal.

There is very little difference between the sexes in terms of body sizeand shape. The parents generally referred pink colour for girls and blue colour for boys.

Preteens (5-12 years):

The children from 5 to 12 years age come under this category. The average growth per year over this period in 6 cm. The average onset of puberty is at 10 or 11 for girls and age 11 or 12 for boys. Some of the most significant aspect of pubertal development involves distinctive physical changes in individual's height, weight and body composition. These changes in the body shapes require different silhouettes and variations in garments to fit in the contours. Generally, cotton, poplin, thin cambric, satin or rayon varieties can be worn. Slightly thick variety of cotton, handloom material can be used for petticoats for children.

The garment industries and retailers are capturing huge market of licensed product for apparel, specially under garments, night wear dresses. Clothing for this age group should have built-in-growth feature. Ex: large hem for frocks skirts and pants.

Classification ofChildren's garments

The different categories of children's garments are:

- Casuals
- Day wear
- Night wear
- Party wear
- Uniforms
- Sport wear
- High fashion wear

Casual wear:

Casual is the dress code that emphasizes comfort and personal expression over presentation, formality and conformity. This type of dress may be referred as leisure wear. E.g. T-Shirts knitted garments. for casual wear as they stretch with body movement and are comfortable to wear.

Day wear:

Clothes wear in the day are termed as day wear. E.g. sun suits, frocks, bloomers, two-piece garments etc. During summer season suitable fabrics for day wear are cotton, linen, organza, woollen clothes, double knits, corduroys can be chosen for winter season. Day wear garments will have to withstand a lot of wear and tear and are subjected to repeated laundering.Hence the fabrics should be durable and seams should be strong and fastenings should be secure.

Night wear:

Clothes worn in the night comes under this category. Night wear clothes are comfortable for children. Cottons and knits are ideal for this type of garments. The garments must be loose and should not have any pricking accessories.

Party wear:

Selection of garments for special occasions comes under this category. Garments worn on special occasions are termed as party wear. Fabrics like velvet, denim, satin, chiffon, brocade, silk etc can use for party wear dresses. The trims, decorations and accessories used for this garment should be safe and does not harm the child in any way.

Uniforms:

The material chosen for school wear would depend on where one lives and season of the year. Children's clothing should be

1) Patterned for growth, ease and freedom, yet it should not be too large.
2) Well-constructed to stand,hard wear and should be comfortable.
3) Simple, accompanied by becomingness of line and colour.
4) Closely woven material which will remain fresh even after several washes.
5) Certain treatments like anti-bacterial finish can help to protect the child from common bacteria and fungi.

The garment worn to school gives the children a special identity is known as uniform. These garments have to withstand a lot of wear and tear and at the same time should be comfortable to the child.

Sports wear:

Clothing designed specially for children or any one, pursuing sports. Garments worn while playing sports come under this category. The sportswear garments should look for freedom of movement. Knitted garments extend in both length and width wise directions. Knitted materials are mostly selected as sportswear for children.

High fashion wear:

The latest fashion garments come under this category. These garments are preferred by high income families in the society. High fashion refers to creation of exclusive custom fitted clothing. It is characterised by uniqueness of designs, bright vivid colour and use of high fashioned fabrics.

Requirements for children's clothing: **While children's clothes are to be tailored insist on**:

1) Good workmanship, durable flat seams
2) Fasteners sewn firmly to withstand tugging and pulling
3) Button hole closely worked
4) Roomy neck openings
5) Strong reinforcements at all points of strain such as placket-openings, pocket corners, knees, elbows, armholes.

The ideal children's clothing should be:

1. Soft, comfortable, easy to put and take off and relatively loose.
2. Easy access to the Nappy as it requires changing due to frequent wetting
3. Non-irritating
4. Light weight
5. Non-flammable
6. Under clothes should be essentially made of organic fibres
7. Allow quick absorption of sweat from the skin
8. Easily identifiable front and back, right and left.
9. Elastic waist line instead of belt or sash.
10. Zipper with large pull rings/tabs.

Various materials suitable for children's garments:

Indian mothers choices to various children'sclothing are Jhangia, Jabla, Romper, A-line frocks, Baby frock with bib. The fabrics suitable for these garments are:

Garment type	Suitable material
Jhangia	Soft absorbent cotton, voile, cambric, poplin.
Jabla	Muslin, cambric, voile, poplin, jersey.
Romper	Denim, pile/napped, twill, long cloth.
A-line frock	Jersey, linen, madras poplin.
Baby frock with bib	Chiffon, crepe, satin, georgette, jacquard, organza, velvet, silk, printed cotton, handloom material.
Skirt wraparound	Satin, printedpoplin, crepe, velvet, silk, denim.

The decorative and safety considerations in children's clothing:

Many decorative details can be added to the children's garment include tapes, trims, decorative stitching and appliqués. These can be top stitched to a

garment. Some children are very curious about everything, even trimmings on their garments. There is a likelihood of these trims being ripped off and eaten. So, all such decorative trims must be stitched and attached securely.

Tapes and trims:

Tapes and trims, such as rickrack, bias tape, braid, ruffled stretch lace and middy braid can be top stitched to a garment. To apply these features quickly and easily, use a fabric glue stick to hold them in place while stitching.

Reflective tapes:

These are helpful safety features that can be added to a garment for a decorative effect. Stitch them to children's outdoor wear, rain wear and hallo wean costumes. There are three types of reflective tapes. They are 1. Florescent 2. Reflective or retro-reflective 3. Fluorescent-reflective.Select the tape that best suits the use of the garment, for safety sake stitch reflective tape to cuffs, collars, sleeves and waist bands or outer wear.

Fluorescent materials:

Seem to glow because they emit light as well as to reflect it off their surface. They are unusually bright during day but they are not as effective at night.

Reflective or retro-reflective materials:

These materials do not glow. They must be illuminated by an outside light source. This material reflects incoming light directly back to its source. The viewer is near the light source, such as, an on-coming the head light. A great deal of light is reflected back, making the material look bright. These reflective surfaces are only reflective to artificial light, but not tothe day light.

Reflective-fluorescent materials:

Combine the properties of both reflective and fluorescent materials. This surface is fluorescent during the day and reflective at night, providing all-purpose use for children's outdoor clothing.

Summary:

For children's clothes lot of fabrics are available in the market. The fabrics suitable for the garment type and requirements for children's clothing are discussed. The decorative and safety consideration can be added to children's clothes to make the clothes safer to the children.

Short Answer type questions:

1. What is high fashion wear?
2. What is a uniform?
3. Night clothes are made up what materials?
4. What are the requirements for children's clothing?
5. What is a florescent material?
6. Give examples for day wear clothes.
7. What is a casual garment? Give example.
8. Write short notes on tapes and trims.
9. What is the purpose of reflective tape?
10. What is reflective material?
11. What is reflective-fluorescent material?
12. Name the materials suitable for A-line frock.
13. Name the materials suitable for Jhangia and Jabla.

Long answer type questions:

1. Explain safety and decorative considerations in children's clothes.
2. List out various children's garments preferred by Indian mother. Indicate the type of material suitable for each one of them.
3. Classify children according to their age and explain features in their garments.
4. How will you classify children's garments?

Unit 4

Clothing selection

Structure:

Introduction
Clothing theories
Functions of clothing
Factors influencingthe selection of clothing
Clothing for different age groups

Learning objectives:

After studying this unit, the student will be able to

- Understand the functions of clothing
- Comprehend the factors that influence selection of clothing

Unit preview:

Clothes protect our body, convey socio-economic status and communicate a message to the observer.There are certain factors that affect our choice of clothes. Choice of clothes is largely dictated by fashion, status and profession.

Introduction:

In spite of flexible standards in and the lack of emphasis for clothing,the most individuals experience, occasions of feeling extremely well or extremely poor dressed. This means that any study dealing with the individual in society should take into account thistowardsclothing.

There is a highly significant difference among individual attitudes towards the importance of dress. A well-dressed person is more relaxed, comfortable, confident, secure and even happier and friendlier.

A small child soon acquires definite likes and dislikes. For proper physical and social development, his clothes must be suitable for his activities and similar to those of his playmates. His conscious of clothes is, what other children wear and wants to look like them. For Example, a child will not enjoy

wearing ajacket when his play mates are wearing sweaters. A child may suffer being over dressed, feel inferior because he is not dressed like his friends.

Clothing theories: 1.

The modesty theory:

This theory familiar from the Mesopotamian legend of the Garden of Eden and Eve's seduction by the serpent, holds that clothing was originally donned to conceal the genital organs, from sense of shame, modesty, embarrassment or some other form of sexual emotion. It is assumed, the practice of covering the body has grown as sexual self-consciousness has become more refined.

2. The immodesty theory:

This theory, popularized by West mark and Havelock Ellis, maintains that the intent and purpose of clothing in the beginning was salacious, designed to attract attention to sexual organs and sexual functions and in general to make the wearer a greater object of sexual interest. The doctrine that familiarity breeds indifference and concealment, especially pretended or partial concealment increases interest.

3. The adornment theory:

The theory that clothing begins in the desire to attract attention, or secure prominence, not necessarily of a divert sexual sort. The primitive clothing on this theory is conspicuous ornamentation.

4. The utility or protection theory:

The supposition that clothing had its origin in attempts to protect the body from injurious or unpleasant features of the environment, animals or even super-nautral powers.

Clothing is classified into two classes:

- The fixed
- The modish

The fixed are substantially permanent and are not subject to fashion changes but vary with each locality.

The modish type predominates in the western countries and changes rapidly in point of time over all parts of the world, which are subjected to fashion changes.

Functions of clothing:

Clothing serves the following functions:

- Intrinsic function
- Communicative function

Intrinsic function:

This includes adornment, modesty, convenience, utility and protection. Clothing highlights our good qualities and camouflages the bad one is therefore contributes to our physical attractiveness. Modesty is the quality of expressing moderate or acceptable behaviour. Clothing allows the wearer to perform certain tasks and protects one from harsh weather, diseases and animal attack.

Communicative function:

Clothing may have socio-economic status, group affiliation and personal identity.

Social-psychological function:

Clothing assists the individual in meeting his developmental needs and in expressing or enhancing his self-concept and self-esteem. Clothing can also decrease or increase one's confidence. It influences the amount and kind of social participation. It is therefore a guide to one's general conduct or behaviour.

Factors influencing the selection of clothing:

The selection of clothing should be done on the basis of 1. Age 2. Season 3. Income4. Occasion 5. Fashion 6. Fitting 7. Quality 8. Suitable fabrics 9. Design 10. Maintenance and upkeep cost of clothes 11. Religion (beliefs and norms) 12. Occupation.

1. **Age**:

While selecting fabric one has to think of the age group of the child. For small children, dainty prints in soft colours can be chosen. Nursery prints are

not suitable for elementary schoolchildren. When the children enter late childhood stage, the boys like masculine colours for ex: blue, greyish blue, brown and girls like to wear feminine colours like pink, green, red etc, some fabrics which are delicate are chosen for girls clothing where as rough textured fabrics are suitable for adolescent boys.

The style of dress also changes according to the age group of the child. The A-line dresses are suitable for toddlers and infants. Later on dresses with lots of gathers are suitable for girl's frocks. In the same way that type of collars are suitable for younger age group for ex: baby collar is not suitable for adolescent but for small children.

2. **Season**:

   Some fabric colours are suitable for winter while others are not, for ex: synthetic, silk and wool are suitable for winter as they are bad conductors of heat. Cotton and cotton blended with synthetics are good for summer as they are good conductor of heat and are absorptive. They are comfortable in summer. There are cool and warm colours. The cool colours are associated with coolness, for ex: blue, green, white etc. Warm colours are bad conductors of heat and associated with warmth for ex: red, golden yellow, orange etc. So warm colours are suitable for winter, where as cool colours are chosen for summer.

3. **Income**:

   Amount of money effects the selection of clothing. Children belonging to high income group can spend more percentage of money on clothing as compared to low income group. They can spend more money on fashionable garments rather than durable clothes. Parents belonging to low income group prefer durable clothes rather than delicate ones. So, the preferences of the clothing changes according to the income of the family. Low socio-economic groups give more importance to durability, comfort and price, as compared to becomingness and beauty.

4. **Occasion**:

   Selection of clothes also change according to occasion. For daily wear and informalwear, durable dresses with simple designs can be chosen but for occasional or formal wear novel fabrics with new styles are chosen. Dresses with trimmings and decoration are selected. These fabrics can be dry cleaned if required.

5. **Fashion and latest trends**:

Fashionable clothes look beautiful,but they look odd when they go out fashion. Some clothes should be simple, some fabrics and colours are in fashion while others or not. Children belonging to high income group can wear fashionable clothes to a great extent as compared to low income group. Extremes of fashion should be avoided.

6. **Fitting**:

The preschool child needs clothing that fits close to the body and is free from dangling ties or ornamentation that might catch on things, loose clothing, too long pants or sleeves, large pockets and similar features may get caught in the wheels of tricycles, get stopped when climbing or catch on sticks and protruding objects causing the child to fall. Draw string at the neck or waist and long ties on hoods and caps are dangerous because children have a tendency to pull the strings as they climb and play. Loose fitting shoulder provides freedom of movement for stretching and fitting. Adequate room at the hips and crotch will permit reaching bending and standing or sitting without bending. Most garments should hang from the shoulders, tight bands at the waist should be avoided.

7. **Quality**:

Children's garments should be light in weight with minimum warmth and protection. Some garments tend to tire the child and they restrict his activity.Colour, design and texture of the fabrics used should be suitable for the age and size of the child.Sturdy, soft and easily cared material is most appropriate for children's clothes. A good quality fabric with a firm, close weave made of firmly twisted yarns that will not wrinkle or soil easily is preferable for most outer garments. Clothes worn next to the body, especially under clothes should be of loosely woven or knit fabric to provide body ventilation and absorb moisture.

8. **Suitable fabrics:**

All fabrics used for children's clothes should be pre-shrunk. If they are not, a garment many shrink the equivalent of two sizes in the first washing and thus become un wearable. Suitable fabrics for children's clothing should wash and iron easily. Preferably they should require no ironing. Cotton is by far the most important fibre for preschool children's clothes. It is considered to be hygienic, easy to launder, absorbent and comfortable.

9. Design:

Good design in preschool children garments is based on the same principles as good design in garments for the adult's harmony, balance, proportion, rhythm and emphasis in both garment style and fabric. In addition, clothes for small children should stress simplicity and make adequate allowance for growth, self-help, ease of care and comfort.

To provide growth in height:

1. Skirts and dresses with deep hems or tucks at the bottom. Trousers with a wide cuff.
2. Dresses and trousers with tucks at the waist line to lengthen the upper part of dress or to lengthen the clothes.
3. Overalls with adjustable long straps and deep cuffs or hems.
4. Yokes with crosswise tucks that can be releasedas trunk or body lengthens.
5. Dresses with indefinite waist line or no waist line and deep hems.
6. Stretch fabrics.
7. Two-piece garments.

To provide for growth in girth or width:

1. Raglan or kimono sleeves rather than set in sleeves.
2. Tucks, pleats or gathers at shoulder line.
3. Large under arm or leg seams to let out as needed.

10. Maintenance and upkeep cost:

The care and maintenance required by garments governs the choice of clothes.Synthetics are easier to maintain than cotton and silk. Woollens require gentle handling. Suede and leather garments also require special handling. Heavily embroidered clothing is difficult to launder.

11. Religious beliefs and norms:

Certain religious beliefs and norms followed in a particular society are the deciding factors for clothing selection. Ex: black is avoided on

auspicious occasions, white coloured garments are favoured by certain communities during marriages.

12. **Occupation**:

Many professions have a specific dress code which gives them a special identity. Ex: doctors and nurses use white coats, lawyers use black robes. Overalls are used by factory workers. Soldiers use a uniform. Sports men need durable and porous clothes for sweat absorption. Working people should wear formal clothes. They should be simple, neat and clean. Revealing and improper clothes should be avoided at work places as it does not project professionalism.

13. **Figure**:

Each individual has unique figure, selection of clothes should enhance the appearance of figure. The dress style should complement the wearer. Judicious use of colours and fabrics can help to camouflage any figure irregularities. Ex: short people look taller by wearing vertical line clothes.

14. **Colour**:

Colour of the dress reflects the personality of the wearer. Colour is an index of individual's interest. Selection of colours should aim at enhancing the personality of the wearer. Some people like gaudy and bright colours, while othersprefer dull and sober. Colours express varied moods. Warm colours like yellow and red are indication of cheerfulness and enthusiasm and also stimulating. These colours go well with extroverts.

Clothing for different agegroups:

Clothing for an infant:

The three ‘musts’ in clothing for the new born babies are warmth and hygienic conditions outside their mother’s womb, the new born baby will react to the variable temperature of his new environment. Babies do not have thermo-control as grown-ups. Thus, they have to be watched very carefully in climates where there are sudden changes of temperatures. Also new born babyis much more subject to fever producing infections, many of which can be transmitted by clothing if

care is not exercised. During the first few months of life, the baby will sleep 80 percent of the time and must have comfortable clothing for sleeping. This need for sleep gradually decreases, until at a year he will be awake about as much as he will be asleep.

The amount and type of clothing, the infant requires, will be determined to some extent by general and climatic conditions, room temperature and health condition of the infant. The most suitable fibre for infant clothing is cotton, because it is soft and can be kept hygienically safe by washing in boiling water.

Key points for selection of infant's clothing:

1. Infant's clothes should be selected primarily on the basis of comfort and ease of care. Garments whichrequireno ironing, are easy to put on the baby and have no hard-rough surface to cause discomfort are considered most suitable.
2. Baby clothes should be soft, pliable and non- irritating.
3. They provide ventilation to allow any moisture to evaporate. Inadequate ventilation cause moisture to stay next to baby's sensitive skin and may result in skin irritation.
4. Clothing should be simple and well-constructed. Fancy trimmings require extra care in laundering and often irritate the baby.
5. Knit fabric garments stretch with body movement and are easy to put on the infant.
6. Openings all the way down the front or back make dressing simpler.
7. Ties or flat fasteners are more comfortable, draw-string necklines are not recommended because the infant might have caught in the strings.
8. If ties or buttons are used, they should be inspected often to make sure that they are sewed securely.
9. The rate of physical growth is rapid. Extra seam allowances and hems can be given.

Clothing for crawling-child (1 year):

After the baby has begun to creep about more clothes are required, partly for safety's sake. Overalls are the simplest form of garment for both sexes. Especially those with snaps in the crotch help easy change of diaper. Dresses

get in the way when the little girl starts crawling. Overalls shield tender knees from floor.

1. Reinforcement in the knees of pant legs will provide for greater durability.
2. Snapper or grippers on the crotch of overall save time when diaper changes are necessary.
3. Garments of firmly woven or knitted fibres with appropriate seam finishes will give good service for rough wear and many launderings.
4. In cold weather zones, a snow suit, mittens and hood will be necessary.
5. A light weight wind resistant and washable fabric such as nylon or polyester is desirable for this garment.
6. During the crawling ages soft-soled shoes may be worn if protection from cold is needed. Shoes are about ½ inch longer than the toe and stocking should be ½ inch longer than the foot.
7. Training pants are often worn when toilet training begins. Training pants will continue to be worn until toilet training is accomplished. These pants are made of two way stretch fabrics which fit snugly at the hip.Centre panel of two, three and four layers provide for absorption and protection. Training pants of knit fabrics are desirable since they will give ease as the child moves about and stretch, inherent in the fabric will allow for some degree of growth.
8. Creepers are physically more active than new born babies. Their clothes should be able to absorb sweat due to their activities.
9. Strong and durable fabric are suitable for this age group. They crawl on the floor, fabrics from knees wear off due to friction. But strong and durable fabrics can withstand the friction. Reinforcement can be given at knees with the help of a patch.
10. Garments with adjustable straps are more suitable due to growing stage.
11. Very long and loose dresses are not good for him. The child might entangle while crawling.

Clothing for the toddler:

The toddler needs clothing that provides maximum freedom for all the activities usual at this stage. Again, overalls are preferred especially if they have wide shoulder straps that are long enough adjustments as the

child grows. One-piece garments with gripper openings are preferable as they allow the rapid growth of the child. Never the less, during crawling and toddler stages, one-piece pyjamas are usually safer and neater than two piece-ones. Pyjamas should be made of soft washable material.

Clothing for the preschool child:

Clothing for the preschool child may become a major problem for the family because it is expensive yet is used for only a short time. It should be selected to help the child develop self-confidence, practice social skills and interact with peers. Garments should be flexible comfortably warm, easily cleaned soft. They should be convenient for frequent toileting, adjustable to the rapidly growing body changes, which are attractive in design and fabric. Children of this age also need make-believe clothing to accommodate their dream-world fantasies. Such garments are usually very expensive and are of poor quality fabric and cheap construction and give limited wear.

Summary:

Clothes play an important role in socialization. Children's clothes should be simple and comfortable, giving them freedom of movement. They should protect the child and keep them safe. Several comfort and safety features can be incorporated in clothing. It is also important to select appropriate materials based on the garment style.

Short answer type questions:

1. List out the functions of clothes.
2. Professionals have specific dress code. Elaborate on this statement with examples.
3. Explain any two factors affect clothing choice.
4. The income of family influences clothing choice. Explain.
5. Name clothing theories.
6. Explain classification of clothing.
7. Write functions of clothing.
8. Write any four points for the importance of clothing for infant.
9. How will you select clothing for atoddler?
10. How will you select clothing for the preschool child?
11. Write about the importance of quality in clothing.

Long answer type questions:

1. Discuss about the factors that influence clothing choices.
2. Write about classification of clothing and clothing theories.
3. Explain the importance of clothing for infant age group.
4. Explain the importance of clothing for any two age groups.
5. Write about the following which influences selection of clothing.
   a) Fitting b) suitable fabrics c) design

Unit 5

Preparation of Material for cutting and layout

Structure:

Introduction

Various processes of preparing a fabric for cutting

Different Layouts

Different methods of marking

Fabric cutting

Learning objectives:

After studying this unit, the student will be able to:

- Gain knowledge on various processes of preparing a fabric for cutting
- Know about different types of layout
- Different methods of marking
- Know the method of laying a fabric and cutting

Unit preview:

Fabric should be prepared for cutting by following certain procedures in order to achieve a better fit and a professional look to the garment.

Introduction:

Most of the fabrics are generally constructed grain perfect. When the lengthwise and crosswise grains are running at right angles to each other. It is termed as **on grain**. During some of the finishing processes like dyeing, printing the fabrics may become off-grain. When the lengthwise and crosswise grains are not at right angle to each other, it is called as **off grain**. If such a garment is used in construction of garments, the garments may stretch and sag. Garments

made from off grain fabrics will not fit correctly and will hang poorly, when worn it will sag.

To avoid these problems, fabric should be selected on grain for garment construction. Even if the fabric is off grain on purchase, there are ways of straightening the grain.

Various processes of preparing a fabric for cutting:

All fabrics that are to be sewn have to be prepared by the following steps:

Step 1: **Preshrinking:**

Soak all cottons, overnight before cutting. Because the warp yarns are stretched tight during weaving. Shrinking relaxes these yarns. Also, it is better to shrink it in the fabric stage rather than the garment stage as the garment may not fit the wearer after wash. Then neatly iron before marking and cutting the fabric.

Step 2: Making the fabric thread perfect in the crosswise direction:

To make the fabric thread perfect, select one of the following methods:

a) For woven fabric, pull a crosswise yarn then cut along the pulled yarn.

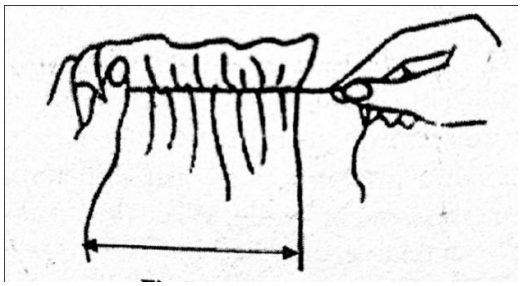

Fig: 5.1 Cross wise grain

b) For knit fabric, baste along a crosswise course.
c) For slippery fabrics, pin along a crosswise yarn, removing the pins as you cut along the line.

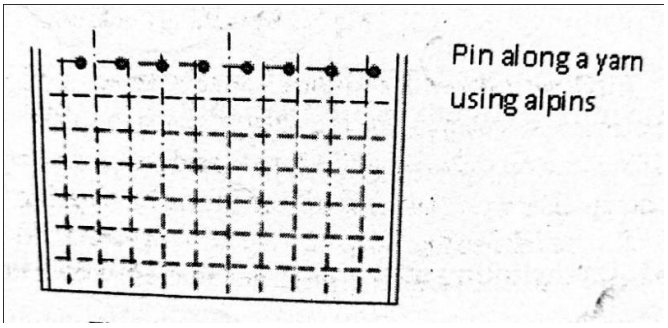

Fig: 5.2 pinning the fabric

Both cut ends/crosswise/weft of the fabric should be made thread perfect. Selvedge edges are thread perfect and do not require this process.

Step: 3<u>Making the fabric piece perfect</u>:

Fabric that has been pulled off grain during the final finishing process must be corrected and set on grain. To set the fabric on grain, follow the methods:

a) <u>Stretching the fabric in bias direction</u>:

The woven fabric is held at the opposite ends and pulled diagonally. This helps in realigning the lengthwise and crosswise grains. When it is done in damp condition, it gives best results.

To make a woollen fabric grain perfect, lay the fabric on a wet sheet and fold it up. Let fabric stay for 8 to 12 hours to allow the fabric to become damp. Then un fold. Remove fabric from the sheet. Lay it on a flat surface. Position the fabric gently by pulling and smoothing it on grain. Let fabric dry overnight.

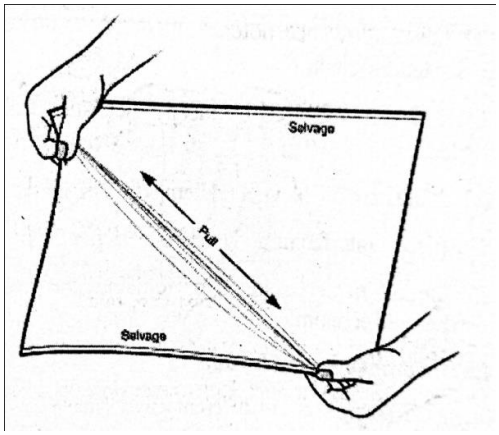

Fig: 5.3 stretching the fabric

b) Drawn thread method:

Loosely woven fabrics can be cut straight along the crosswise yarn. In case of firmly woven fabrics, pull a thread and then cut along the pulled space. Another method is to tear off the fabric by clipping the selvedge. For sheer fabrics and fabrics that fray, clip the selvedge and then gently pull one crosswise yarn so that it causes a puckered line. Now cut carefully along the puckered line.

If the fabric is flat without wrinkles, the crosswise and lengthwise edges are at right angles and then it is ready to cut.

Different layouts:

Once the fabric is grain perfect it has to be laid out for cutting. Arranging the pattern pieces economically is termed as layout. While economizing, fit and comfort should not be compromised.

Rules for layouts:

- Number the pattern pieces for easy identification.
- The general order of the layout should be from left side to right side.
- Lay large pieces first and then fit in the smaller ones
- All laying should be done on the wrong side of the material.
- When laying, the length of the garment should be parallel to the selvedge of the material.
- Be sure, the pattern is placed in the correct grain.
- Fabrics drape and fall better on the lengthwise grain and also last longer.
- The seam allowance, notches and darts should be marked with clarity using tailors' chalk.
- Curved seam lines must be traced either with a tracing wheel or tailor's tacks.
- When laying the paper pattern, consider the design of the fabric.
- Care should be taken to see the design runs in the same direction throughout the garment.

- All checks and stripes should match the seams both lengthwise and across.

The different types of layouts :

A fabric can be laid out in different ways. They are

a) Open layout
b) Lengthwise centre fold
c) Off centre lengthwise fold
d) Crosswise centre fold
e) Off centre crosswise fold
f) Double fold
g) Combination fold

a) Open layout:

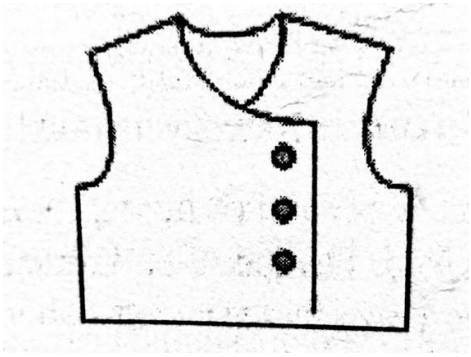

Fig: 5.4 Asymmetrical top design

In this layout, the fabric is not folded at all. It is spread open with wrong side up, on the cutting table to its full width and length. This method is not economical as more time is needed for laying, cutting and fabric consumption also more. All asymmetrical designs are cut using this type of layout.

This method is used in mass cutting industry where several layers are cut in one size. E.g.: a wrap over top, house coat that wraps over.

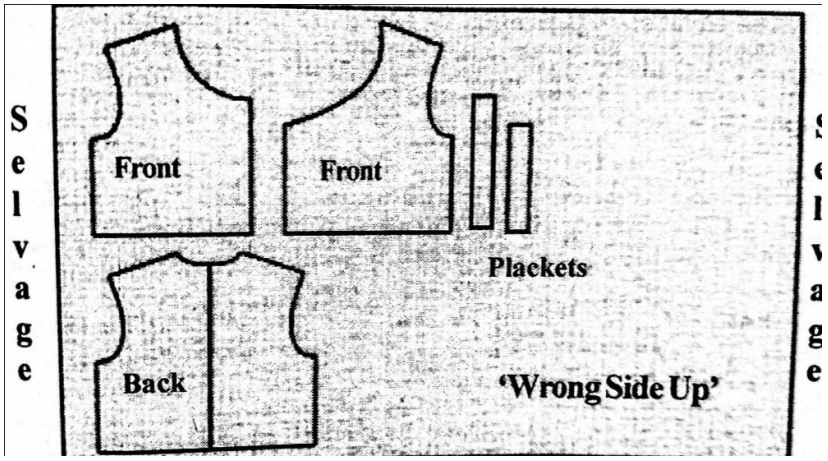

Fig: 5.5 Open layout

b) <u>Lengthwise centre fold:</u>

In this layout, both the selvedges are folded. So that they layone onthe top of the other, with the right sides facings each other and the wrong side on the top. The fold is parallel to the selvedge. This is the simplest and easiest layout. e.g. A-line frock.

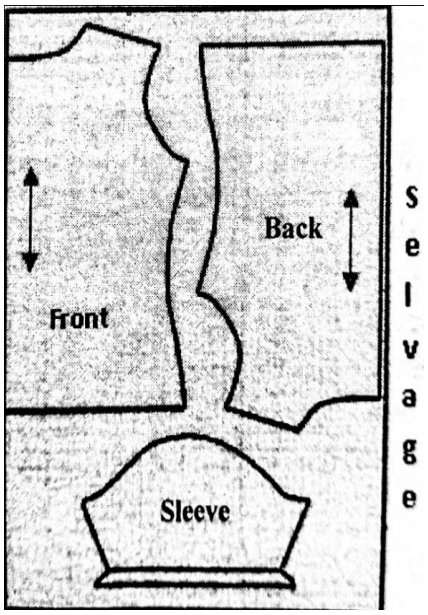

Fig: 5.6 Lengthwise centre fold

c) <u>Off centre lengthwise fold</u>:

In this layout, one selvedge is placed at a measured distance from the fold. The rest of the fabric is in a single layer. Width of the folded portion is determined by the widest pattern piece. Care is taken to see that all the patternsshould be kept at uniform distance. This layout is used when narrow pieces have to be cut on fold. e.g.: child's knicker.

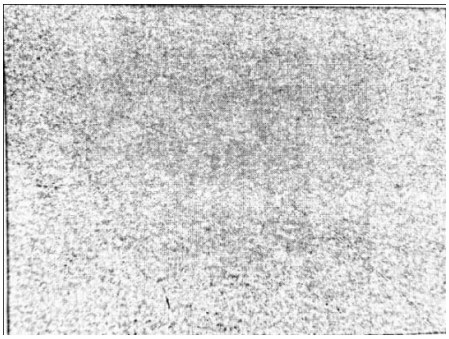

Fig: 5.7Off centre lengthwise fold

<u>d) Crosswise centre fold</u>:

In this, the fabric is folded along a crosswise weft. The crosswise fold, like the lengthwise fold, could be full or partial fold.

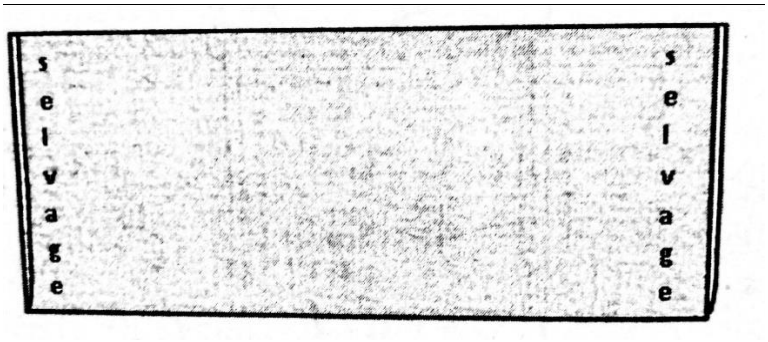

Fig: 5.8 Crosswise centre fold

e) <u>Off centre crosswise fold</u>:

Pattern pieces that are too wide to be cut on lengthwise fold can be cut with this layout. Here only a part of material is folded along a weft yarn. The main advantage of this type of fold is that only a part of fabric is utilized.

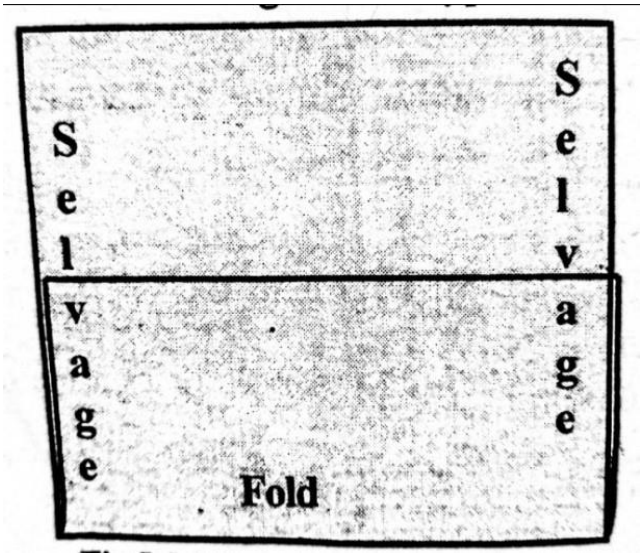

Fig: 5.9 Off-centre crosswise fold

f) <u>Double fold</u>:

In this, the selvedges meet at the centre. When both front and back pieces are to be cut on a fold, this method is used. It is important to maintain the distance from each fold to selvedge. Fabrics with widths ranging from 50” to 60” or more are suitable for this type of layout.

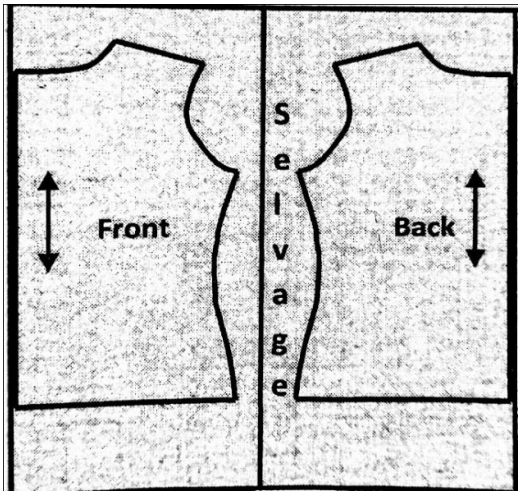

Fig: 5.10 Double fold

g) Combination fold:

The fabric is folded lengthwise and then crosswise. Since both the folds are combined, it is termed as combination fold. A saree petticoat or a four-gored skirt can be cut using this type of layout.

Different methods of marking:

After deciding the type of layout that is economical for the drafted pattern, the pattern details need to be transferred on the fabric. This can be done by manual or a computerised technique. For manual method, use tracing wheel, carbon paper, tailor's chalk of contrast colour chalk and common pins for marking.

a) Tracing wheel:

For delicate and sheer fabrics, tracing wheel is not appropriate as the teeth of the tracing wheel may damage the fabric. For thick, smooth textured, heavy fabrics tracing wheel can be used and marking can be lined with pencil or chalk later.

b) Carbon paper:

When tracing pattern lines on fabric, carbon paper of good quality must be used. Carbon marks will be left on cloth and may be visible from right side if the fabric is transparent. While using carbon paper, tracing should be done lightly. Yellow carbon is ideal to transfer pattern markings.

c) Tailor's chalk:

The markings on the pattern like slashes, notches and darts can be marked directly on the fabric with tailor's chalk. Marks on the top layer can be transferred to the remaining layers of the fabric by using a carbon paper or tracing wheel.

d) Common pins:

Pins help in anchoring the patterns to the fabric. Pattern edges are then marked with tailor's chalks.

e) Computerised technique:

- The marker planner uses full size pattern and arranges them in an economical manner on marker paper.
- This is a special printed paper having symbols on it which enable the marker planner to visually control the positioning of components according to specified grain lines.
- Markers produced on paper are fixed to fabric with pins, staples or an adhesive paper which is heat sealed to the top layer of the fabric.
- Marker provides details of the spreads. In cutting room, the fabric is laid manually or spreading machine is used to arrange the fabric in lays (100 layers).
- The supervisors of marker planner plan and allocate the cut orders to various operations to be carried out in the cutting room.

Fabric cutting:

Once the markings are over on the fabric, the pattern components are removed and stored for future use. The next step is to cut the fabric along the pattern lines marked. Cutting should be done on a flat and firm surface. Of all the operations in the cutting room, this is the most decisive, because once the fabric has been cut, very little canbe done to rectify the defects. The following steps should be followed for fabric cutting.

- Seam allowances should be checked whether they are included or not. If pattern is without seam allowance, it should be added to the fabric.
- Place the fabric on the cutting table, hold the material with left hand and cut with right hand.
- The material should not be moved while cutting, instead go around the table to cut. If the material is moved the grain may be shifted.
- Cut along the cutting lines accurately and smoothly.
- Notches should be cut wherever necessary.

Summary:

Fabric brought from the shop requires preparation for cutting. It is advised to shrink first before cutting to avoid garment shrinkage upon washing. Different fabrics require different pre-treatments. The pre-shrunk fabric is then laid on the cutting table using any of the above methods. Certain fabrics like checks, plaids, stripes, borders, velvets etc require special handling. Care should be exercised while transferring pattern marking. Then a proper layout should be planned depending on the availability of material and the type of dress design.

Short type answers questions:

1. What is layout?
2. Specify the importance of grain in garment construction.
3. State the different methods of marking.
4. Why do we need to preshrink fabrics?
5. Define off grain.
6. Define on grain.
7. Name different types of layouts.

Long answer type questions:

1. Describe various ways of straightening fabric grain.
2. Explain different layouts with diagrams.
3. Describe the steps to be followed while fabric cutting.

Unit 6

Criteria of a well finished garment

Structure:

Introduction
Good fit in relation to ease, line, grain, set and balance
Standards for a good fit
Reasons for poor fitting
Solving fitting problems
Dress making techniques that influences good fit

Learning objectives:

After completion of this unit, the student will be able to

- Comprehend the characteristics of well finished garment
- Know about the dress making techniques that influences good fit
- Learn about solving, fitting problems

Unit Preview:

Techniques of good dress making are essential for good fitting and good designing. Some skills to be mastered are, placing patterns, trueing in grain, cutting accurately and machine stitching exactly.

Introduction:

Good fitting is achieved by doing the work with care, patience and practice. A well fitted garment feels comfortable, adjusts naturally to the activities of the wearer, is becoming in line and amount of ease and consistent with current fashions.

Good fit in relation to ease, line, grain, set and balance:

A good fitted garment always gives pleasure to the wearer and gives good name to the brand or tailor. The most important factor of garment construction is “It should be comfortable” whether a garment fits well or not decided by the

five basic factors. These are ease, line, grain, set and balance. These five are interrelated.

A well fitted garment is a source of satisfaction and looks nice. A well-fitted garment has optimum amount of ease and its seam lines follow the general silhouette of the body. Any fitted garment is judged by its appearance on the wearer and its success depends a great deal in its fitting. Fitted garments are comfortable and allow the wearer to perform normal activities. They also fit snugly to the body of the wearer. It drapes neatly and sets without any wrinkles, without sagging or projecting out and will also be well balanced.

To get a good fitted garment the patterns which are selected should be checked properly and they should possess a good shape and proportion. While cutting the garments, it is necessary to follow certain accurate steps. Most of the human figures might not be perfect or proportionate and therefore alterations and corrections are necessary. It is essential that after drafting a particular garment it should be tried on bodyso that the necessary alterations of the patterns can be done.Apart from the major defects of the body there may also be certain minor defects, which should be taken care of while drafting a garment.

To get a good fit, the planning of patterns along the side of the grain, cutting accurately, stitching and pressing of darts and ease in fullness and machine stitching should be done exactly on the proposed line. The sleeves should be fixed smoothly and evenly in the armhole.

The factors, which determine whether a garment has a good fit or not are ease, line, grain, set and balance. They are referred to as the standards for a good fit and they are also interrelated to one another.

Standards of a good fit:

Ease:

Ease is the difference between the circumference measurements of the figure and of garment. The amount of ease should be sufficient for comfort andin keeping with fashion, the style and type of garment and fabric used.

Loose garments look clumsy. The garments which are insufficient is identified by tight horizontal creases or by the garment riding up on the figure. Loose vertical folds indicate excessive ease.

A garment that fits without any wrinkles or strain is said to have optimum ease. The indicated ease allowances are:

Back shoulder seam eased on to front about ½ inch or 1.5 cm

Ease round bust line about 4" or 10 cm

Ease across back ½" to ¾ "or 0.5 to 1 cm

Ease across chest ¼" to 3/8" or 0.5 cm to 1 cm

Ease through hips standing 11/2" or 3.5cm

Ease of skirt waist line to fit on a belt=1" or ¼" on each quarter=2.5cmor 0.5 cm on each quarter

Ease at back of sleeve cap 2" to 3" or 5 cm to 7.5 cm

Ease at elbow 1" or 2.5cm (1/2" or 1.5 cm) to be able to bend elbow comfortably.

Line:

Silhouette means line in a garment, the proportion of garment to the figure and various parts of the garment to each other, the shape of curved lines and the placing of the details of the design.

When fitting for line, study the general appearance of the entire garment taking particular note of the silhouette and proportion obviously. Line varies according to fashion, but good line is not determined by fashion and the rules apply constantly. The correct proportion can only be found when actual fitting of the garment on the figure, as it is dependent on the individual figure and on current fashion and is affected by every detail of design such as planning of the seams and width of the collar. Good proportion accents the attractive points of the figure.

Set:

Set refers to the way in which the fabric fits to the contours of the figure. The fabric should be perfectly smooth and free of crease in all areas. In common with balance, the set will be correct, when the grain is correctly positioned, but set is such that, many people prefer to fit by observing and eliminating creases rather than by correcting the position of the grain.

Incorrect set is indicted by creases in the fabric which are caused by curve or hollow of the figure needing more or less width or length. Creases may be tight or loose, and vertical, horizontal or diagonal. The following general suggestions for the removal of creases which apply to all areas of the garment, but which need to be interpreted according to individual circumferences.

The horizontal creases indicate that the garment is riding up on the figure, due to the circumference of the garment being too small in that area. They may be removed by letting out the nearest vertical seam.

Loose vertical creases indicate that the circumference of the garment is too large in that area and may be removed by taking in the nearest vertical seam.

Loose horizontal creases indicate a fault in the balance between the front and back lengths and may be removed by shortening either the front or back length, according to the location of the creases.

Tight vertical creases may be removed by tracing the creases to the curve at which they originate and providing more length and width if necessary to cover the curve.

Tight diagonal creases may be removed by tracing the creases to the curve which they originate and providing more width and length to cover the curve by letting out the nearest vertical seam and the nearest horizontal seam above the creases. Loose diagonal creases may be removed by taking in the nearest seam above the widest part of the creases.

Balance:

Balance is the relationship between the garment and the figure and between various parts of the garment. Balance is correct when the garment hangs equally either side of the figure at all points when viewed from front, back or side and with vertical seams perpendicular to the ground. Ex: the shoulder seam in a blouse does not sag, then it looks balanced.

Grain:

Grain refers to the lengthwise and cross wise threads from which a woven fabric is constructed. Although straight grain refers to either set of threads, the straight grain line on a pattern is always placed parallel to warp threads. The warp threads which are thicker and stronger in most fabrics than the weft threads take most of the strain and also ensure that garment hangs attractively.

The warp grain should be perpendicular to the ground on the centre front and centre back lines and on the centre line of a sleeve. If any of these lines have seams with certain flare, the straight grain line is usually positioned approximately midway between the centre and side seams. The weft grain should be parallel to the ground on the front and back width lines, the hip line and the top area line of a sleeve. If the grain line is not correct, wrinkles or sagging occurs.

Reasons for poor fitting:

When the garments are carelessly cut and if stitching is not done properly then the garment will have poor fitting. If the basic patterns are not of the right size or if they are not altered according to the body measurements then poor fitting occurs. Poor posture might be the reason for difference in the bodice blocks. Such style of a garment is not suitable to the wearer.

The human body has numerous curves of which the basic ones are, bust, end of shoulder, shoulder blade, elbow, abdomen, side and hip. The garment should be cut and stitched accurately to fit the curves of the body.

The straight material should be folded into, darts are cut into seam to allow enough ease over the curves. Wide darts are stitched to control the excess material to give proper fitting.

Solving fitting problems:

Each garment should be checked for ease, comfort, line, grain, set and balance. While cutting, the patterns should be placed parallel to the selvedge, so that the length of the garment will be along the selvedge side. If wrinkles or diagonal folds are observed then the stitching should be released at the bulge areas. It is easier to correct the neckline than to correct the sleeve and the

armhole. The material from seam allowances can be used to increase or decrease the fullness at the bust line.

To get good fitting in the garment it is better to keep 2cms to 2.5 cms extra material at the back, shoulder seam, under arm and side seam. While stitching for good fit accurate pinning, marking, tacking and stitching should be done. The garments should not be too tight as the figure defects will be more noticeable.To get good fitting in agarment, accurate measurements should be taken and patterns are drafted on brown papers.Stitching armhole and neckline should be taken care of. Fullness should be evenly distributed without irregular or puckering pleats. Facings and hems should be finished smoothly. To neaten the seam edges ironing should be done after every shape.

Dress making techniques that influence good fit:

The garment should be tacked without sleeves, collars or facings. The openings are pinned together accurately, properly and securely. The basting line that marks centre front and back helps in giving good fitting.

The garment should be worn right side out to check the fitting on the body. The garment is thoroughly inspected and carefully analysed for fitting. It should be comfortable while walking and working. If any alterations or corrections are to be made on the garment, then it is done either by cutting, tacking, pinning or marking on the garment.

Mark the correct line with tailor’s chalk and tack the corrected seam line or dart line from the inside of the garment. The paper patterns should also be altered on the basis of changes made in the garment. Until a satisfactory fitting is achieved, repining and alterations for fitting is done. In the second round of checking the fitting, concentration must be on the sleeves and armscye. Necklines, waistlines should be curved to fit comfortably and naturally. The patterns which are altered for good fitting should be preserved. Constantly compare the drafted pattern with the body measurements for accurate fitting before cutting any garment, as there may be changes in the body measurement. A dress with too wide or too narrow or too short can be uncomfortable and it is unbecoming. Good fitting is achieved by doing the work with care, patience and practice.

Summary:

A well fitted garment feels comfortable, adjust naturally to the activities of the wearer. Five basic principles decide whether a garment fits well or not These are ease, line, grain, set and balance. These are interrelated. A well fitted garment is a source of satisfaction and looks nice. A well-fitted garment has optimum amount of ease and its seam lines follow the general silhouette of the body. Any fitted garment is judged by its appearance on the wearer and its success depends on its fitting.

Short answer type questions:

1. State the standards for a good fit in a garment.
2. State the role of ease and line for good fit.
3. State the role of grain, set and balance for a good fit in the garment.
4. Give the reasons for poor fitting.
5. State the remedies to solve fitting problems.

Long answer type questions:

1. Describe dress making techniques that influences good fit.
2. Explain the characteristics of well finished garments.
3. Explain the criteria for well fitted garment.

Unit 7

Estimation and cost of material required for the garment

Structure:

Introduction
Estimation of raw materials
Fasteners and cost
Method of costing or pricing

Learning objectives:

- Understand the economic use of fabric and other accessories
- Know the variety of fabrics available in the market
- Know about the elements of cost
- How to estimate the cost of garment

Unit preview:

To estimate the material required, it is essential to have knowledge of different types of fabrics, raw materials and accessories available in the market according to the size and design of the garment. For fixing the price of a garment, know about the elements of cost and estimation of cost of the garment with different fabrics.

Introduction:

To estimate the cloth for different garments is a work of great experience. The width of fabric plays an important role in successful use of the fabric. Normally in the market, different fabrics are available in different widths. Cloth of single width is 27" -36", double width is from 42"-60" are normally of dress material. Some fabrics are specially made of large widths i.e., bed sheet fabric, fabrics for curtains, table cloth etc. mainly casement, matty, khaddar comes in this special width of 72" -90".

Estimation of raw material:

In preparing the garment not only the main fabric is needed but also many other fabrics like underlining, lining, interfacing and interlining are required.

These fabrics are mainly used for shaping the garment, as well as to add to its durability and appearance.

Underlining:

It is a piece of shaping material usually cut in the shape of the design section of the garment used to back that section. The main purpose of underlining is to give shape to the garment and add to the crease section and underlining, are treated as one, during construction.

Lining:

It is constructed separately from the garment and pattern pieces are joined to a major seam. Lining not only gives the shape but also provide a nice finishing look to inside of the garment.

Interfacing:

It is a piece of shaping material and cut in the shape of facing section and is placed between the facing of the garment. Its purpose is to add firmness to the section, usually an edge and help in retain its shape.

Interlining:

Cut in the shape of a lining section and used between a lining and the design section. It is often used in coats or jackets when shape is added to provide warmth. Interlining is constructed separately and catch stitched to the garment facing before the lining is sewn.

Fasteners and cost:

Patterns and fabrics do not cover the entire list of the items you will need for sewing. There is a whole group of interesting items called decorations and trims essential for the completion of a garment.

Threads are available in different varieties such as cotton, nylon and silk thread. One should buy according to the fabric selected.

Buttons:

There are two basic types of buttons. Shank which is sewn to the garment under the button face and sew through the type. Buttons are available in wood, bone, plastic, metal, glass, leather, jet pear and fabric or crocheted. Choose the

buttons that are best suited to fabric and size, considering the colour, texture, design and style of the garment. Be sure to select washable buttons if they are to be placed on a washable garment.

Hooks and eyes:

Are useful where there is tension on a garment or an inconspicuous closing is needed. Select hooks that are rustproof. These are available in silver and black and some are covered. The eye can be either a straight bar type for use on overlapping edges, or the round type for edges that just meet. There is a complete range of sizes.

Zippers:

Zippers are typed according to their purpose, neck zippers, dress placket, zippers, skirt placket zippers, trousers fly zippers and light weight and heavy weight separating zippers for jackets. Some are adjustable. Select zipper in the colour closest to the fabric colour. If you cannot find an exact match select a darker shade.

Buckles:

The size of buckles need to depend on the width of the belt. The inside measurement of the buckle should be slightly wider than width of the belting used. Buckles are available in bone, wood, plastic, metal, leather, pearl or fabric covered with or without a prong. Select the type and shape of buckle, which is best suited to the garment style.

Belting:

Prepare by interfacing fabrics, buckram, heavy canvas or grosgrain ribbon. The commercial beltings are quite fine and easier to use. Belts are plain, rubber backed or leather-backed and are made of heavy cotton and rayon. Belting can be purchased by the yard or in standard belt length packages.

Braid trims:

It is a wide assortment of novelty braid trimmings available, including fold over braid, middy braid, very fine braid shell and novelty trims. The pattern indicates the type of trim needed.

Cording:

It is used to pipe edges and seams, tucks, button holes, in loops and frogs, and in shirting. It is available in various sizes. The fine cable is excellent to use for piping button holes and for fine piped edges. Cording comes in white only because it is covered by the fabric.

Cord piping:

It is a fine cording covered in bias cotton for use as a decorative edge trimming. It is available in assorted colours and provides a neat decorative finish for faced edges and seams.

Nylon tape closure:

It is a type of closure especially useful for fastening opening on belts, waist bands, jackets, slip covers and for attaching removable collars and cuffs. The tape is ½ inch wide and can be cut in to the length needed. There is a wide range. Select the nylon tape close to the fabric colour.

Snap fasteners:

They are available in silver and black and are rust-proof. Snap fasteners should be used where there is little strain, never to replace a button. There is a complete range of sizes, for every weight of the fabric. Some snap fasteners need no sewing, just tapping in place.

Elastic:

It is available as thread or in various widths upto several inches. Ordinarily it is made of nylon or rayon and is limited to white, pink and black. Elastic thread is sometimes available in light blue, brown, navy and grey in addition to the regular white, pink and black.

Shoulder pads:

The style in shoulder padding changes with the look of fashion. The size, shape and thickness will vary according to the fashion of the shoulder line and to the shape of the shoulder. Several shapes of shoulder pads are available in styles for blouses, dresses, suits and coats.

Stays:

They are metal, plastic or bone strips in various widths and lengths and are used for strapless bodices, points in collars.

Bias seam tape of binding:

It is used as a trim edge finish or as a finish for raw edges on the inside of the garments. These are available in various colours and it is available in cotton percale, rayon or silk. It is purchased as single fold, double-fold or wide bias tape.Cotton percale tape used for trimming is also available in stripes,checks and plaids.

The above accessories are used for decorating the garment. With the trimming materials the designer can create new designs. This will depend on the correct selection of trimmings.

The accessories are available in various varieties:

They are:

- Laces
- Gota, sitara
- Patch
- Piping
- Show buttons
- Ribbons
- Cord
- Mirrors
- Stickers
- Threads
- Beads
- Net
- Decorative flowers
- Decorative collars
- Frills
- Ghunghroo etc.

Before buying any cloth for any particular dress, one should consider the following points.

1. Measurement of person i.e. length+widths of main parts of body
2. Width of cloth i.e. how many parts of pattern can be obtained from the width.
3. From where the sleeve can be obtained whether extra cloth is required for it.
4. The cloth should be estimated according to fitting. How much looseness should be kept i.e. are there chances for growth in length orwidth as in case of children.
5. How much is to be kept for turnings.
6. For stitching leave least ½"to1" extra from all sides. In case of fabric which fray out easily, include more seam allowance.
7. Buy extra cloth for the design, frills, gathers etc.
8. Lining cloth also must be purchased according to the fabric.

Keeping all these factors in mind estimation of cloth can be done with great care and accuracy.

Prepare the paper patterns and then estimate the cloth required. Buy sufficient amount of cloth and avoid wastage of cloth.

The estimation of fabric and other accessories differ according to the fitting size and design of the dress.

For latest fabrics and accessories conduct a market survey. Decide the design before estimating fabric and other accessories.

Cost:

Costing refers to the technique and methods used to the actual process of cost finding. Cost is defined as the amount of expenditure incurred on attribute to a given productor to ascertain the cost of a given product.

For fixing price of a garment, the following points should be considered. Size of the garment, cost of the fabric, raw material required, wages of workmen, label cost, overhead charges.

The elements of cost is composed of

a) Material cost:
b) Cost of the material supplied for the purpose of stitching.

c) Wages and labour cost: cost of remuneration of the tailors and employees of the undertaking.
d) Expenses: The cost of services provided to the undertaking and the cost of the use of owned assets.

Each of these elements is further sub divided into direct or indirect costs as follows:

Material - Direct material
Indirect material

Labour - Direct labour
Indirect labour

Expenses - Direct expenses
Indirect expenses

Direct costs are traceable to products or jobs. Indirect costs which cannot be traced in a direct manner. Total of all the indirect costs are known as overhead cost.

Cost can be classified as fixed cost and variable cost depending upon the nature. Cost varies directly with the level of production for e.g. each garment produced involves cloth, button and thread. These costs tend to be constant per unit produced. They are called variables because their total varies with the number of units produced. Fixed cost also known as overhead costs, that do not vary with production or sales. As a company must pay bills for each month a) rent b) interest c) salaries and so on, whatever its output, a fixed cost of the article will continue irrespective of the product level. Variable cost is the sum of the all direct costs. Fixed cost is all the indirect cost.

Methods of costing:

Several methods or types of costing have been designed to suit the needs of individual business conditions. The basic principles underlying all these methods are the same namely, to collect and analyse the expenditure according to the elements of costs and to determine the cost for each cost unit. The main consideration which is applied to the choice of particular methods of costing is in the nature of the manufacturing operation carried

out, the service rendered by the concern. Basically, there are two main systems of costing. E.g. job costing and process costing.

Job costing:

This method of costing is suitable when it is required to obtain the cost or a batch of finished products. The cost unit is taken to be a job which comprises a definite quantity of a product manufactured on an order.

Process costing:

As distinct from job costing, Process costing is employed in industries where a continuous process of manufacturing is carried out. Chemical industries, refineries, power-generating concerns are the examples of process costing.

In garment manufacturing the costing method mostly used is job costing. A job may be small or big, it may be an individual order from a customer or it may consist of products manufactured for keeping them in stock for eventual sale. Following are the different variations of job costing.

1. **Batch costing**:

In this method, cost of and group of products is ascertained. The unit of cost is a batch or group of identical products instead of single job, order or contract.

2. **Terminal or contract costing**:

This method is used in under taking contractual works. The cost unit here is contract which may continue over more than one financial year.

Each garment has two costs, fixed and variable cost. Variable cost will be same in different costing techniques but fixed costs vary according to the method used. E.g. single order, batch order or contractual costing. Total cost of the garment will be the sum of fixed and variable cost.

The material used in stitching are generally cloth, buttons, threads, lining. The sum of the cost of materials needed for a single garment, will be the material cost of the garment.

Similarly, the cost of the labourers who convert raw material into final product is the labour cost needed to produce the garment. Like the piece rate of stitching, interlocking, pecko, and so on.

Expenses include the packing boxes or polyethene needed to keep the stitched garments and so on.

The sum of above mentioned costs will be the variable cost of the garment.

Fixed cost:

It is the cost of establishment of the concern. It varies according to whether the concern manufactured the garments itself or on contractual basis. If it is on the contractual basis then the fixed cost incurred depends upon the terms of contract, like a fixed amount will be paid for stipulated time or the amount paid per piece.

If the concern wants to manufacture on its own then the fixed cost will include cost of machines employed, salaries of the staff and other expenses like rent, electricity charges and telephone bill.

Summary:

The economic use of the fabric and raw material is essential. Estimate the fabric, raw material and other accessories. Know the variety of fabrics available in the market along with their widths. Know about elements of cost and how to estimate the cost of the garment with different fabrics.

Short answer type questions:

1. State the variety of fabrics available.
2. Suggest how the estimation of raw material is done according to size and design.
3. List the accessories used in garments.
4. What is costing?
5. Mention elements of costing.
6. What is fixed cost?

Long answer type questions:

1. Why is cloth estimation necessary for a garment?
2. What are the points to be kept in mind for estimation?
3. What is a fixed and variable cost and explain with examples?
4. Write the methods of costing in detail.

Bibliography:

1. Easy sewing book –Mc calls sewing
2. Pattern making and cutting out – Criffith
3. Practical clothing construction part-II – Mary Methews
4. Clothing construction and wardrobe planning –Lewis, Bower and Kinchner
5. Introduction to clothing construction- Gerry cooklin
6. Introduction to clothing production management-Chuter A.J.
7. Zarapkar system of cutting – Zarapkar K.R
8. Internet – www.Textileschool.com

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COMMERCIAL GARMENT TECHNOLOGY

1ST YEAR

BLUE PRINT

PART-B, VOCATIONAL SUBJECT

PAPER-I PRINCIPLES OF GARMENT MAKING-THEORY

Periods/Week :05 **Periods/Year: 135**

Time Schedule Weightage and Blueprint

S.No	Name of Unit	No. of Periods	Weightage In Marks	Short Answer	Problem Questions
1.	**Terminology** Fabric Garment, Selvedge, Sloper, Bodice Block, Pattern, Commercial Pattern, Grain, Bias. **Tools and Equipment:** Measuring tools, Marking tools, Cutting tools and Pressing tools. **Basic stitches - temporary & permanent stitches.**	10	4	2	-
2.	**Sewing machines:** Types-domestic and industrial machines; Parts and functions; Machine troubles - its causes and remedies; Care of sewingmachine	20	8	1	1
3.	**Pattern Making:** Draping, Drafting, Flat-Pattern, Contents of paper patterns, Merits and Demerits, Uses of paper patterns,& commercial patterns.	10	8	1	1
4.	**Preparation of Material For Cutting:** Strengthening of fabric grain, off grain, preshrinking and pressing of material	20	8	1	1
5.	**Seams and Seam Finishes:** Plain, French, run and fell, Lapped slot seam and piped seam Seam Finishes-Pinked, Edge Stitch, Double Stitch, Herring, Bone Stitch overcast seam finish.	10	8	1	1
6.	**Fullness in Garment:** Darts-Single Dart, Double Dart; Tucks-Pin, Plain, Cross; Pleats-Knife, Box, Inverted Box; Gathers; Shirring, Flare; Godet.	25	8	1	1

7.	**Placket Opening:** Standards of good placket, Tailored placket, Zipper placket, Narrow bound placket, Placket for kalidar kurta; Selection and choice of plackets on various garments.	15	8	1	1
8.	**Neckline Finishes:** Facings-Fitted and Decorative-Binding-Single and Double.	10	8	1	1
9.	**Fastners**: Buttons and button holes Shank buttons Metal buttons Zippers Hooks and Eyes	15	8	1	1

COMMERCIAL GARMENT TECHNOLOGY

1ST YEAR

BLUE PRINT

PAPER-II TEXTILE SCIENCE (THEORY)

Periods/Week :05 Periods/Year:135

Time Schedule Weightage and Blueprint

S. No	Name of the Unit	No.of Periods	Weightage in Marks	Short Answer Questions	Problem Questions
1.	**Classification & General Properties of Textile Fibers**: Definition of terms - Staple, Filament, General Properties – Texture, Resiliency Lustre, Static Electricity, Crimp & Elasticity, Difference between Vegetable & Synthetic Fibres	15	2	1	-
2.	**Manufacture & Properties Of Cellulose Fibres**- Cotton	10	8	1	1
3.	**Manufacture & Properties Of Protein Fibres:** Silk, wool.	15	8	1	1
4.	**Manmade &Regenerated-** Rayon, Polyester	15	8	1	1
5	**Spinning and Yarns:** Spinning – Chemical and Mechanical Classification of yarns-Types of yarns-Twist in yarns-Balance of cloth-Yarn count-Novelty yarns	15	8	1	1
6	**Fabric Construction Methods:** Weaving, Knitting, Non Woven	15	8	1	1
7.	**Looms** Steps in weaving-Weaving process; Kinds of Weaves-Plain weave and its variations, Twill and Satin; Examples of fabrics with such Weaves.	15	8	1	1
8.	**Stains:** Definition-classification-types of stains-general rules to be observed in removal of stains on various fabrics.	15	8	1	1

9.	**Finishes:** Calendaring , Singeing, Tentering, Chemical finish- Mercerising, Bleaching and Dry cleaning.	10	8	1	1
10	**Identification of Fabric Defects:** Major defects in weaving, fabric inspection methods, fabric rating.	10	2	1	-

COMMERCIAL GARMENT TECHNOLOGY

1ST YEAR

PART-B VOCATIONAL COURSE

THEORY

BLUE PRINT

PAPER-III GARMENT CONSTRUCTION

Periods/Week :05 Periods/Year: 135

Time Schedule Weightage and Blueprint

S.No	Name Of Unit	No. of Periods	Weightage In Marks	Short Answer Question	Problem Questions
1.	**Taking Body Measurements:** Points to Remember while taking body measurements-taking and recording measurements for different garments-Children, Women And Men.	20	8	1	1
2.	**Types of Material:** Study on different types of material available in the Market for Children's Garments	25	10	2	1
3.	**Selection of Material for Various Garments:** Jhangia Jabla –Romper-A-line frock-Baby frock with Bib, skirt wraproud,	20	10	2	1
4.	**Clothing selection** Factors Influencing selection of clothing according to Age, Occasion, Figure Type, Fashion, Colour.	20	8	1	1
5.	**Preparation of Material For Cutting,& pattern layout** Marking, Different Layouts; Different methods of marking and laying a fabric and cutting	20	14	1	2
6.	**Criteria of Well Finished Garment:** Ease, Line, Grain, Set, Balance.	20	10	2	1
7.	**Estimation and Cost of Material required for the garment:** Estimation of raw material, Fasteners and cost, Methods of costing	10	8	1	1

Model Question Paper

COMMERCIAL GARMENT TECHNOLOGY

I YEAR

PAPER I PRINCIPLES OF GARMENT MAKING.

TIME:3 Hours **Max. Marks:50**

SECTION-A

NOTE: (i) ANSWER ALL THE QUESTIONS

(ii) EACH QUESTION CARRIES **TWO** MARKS 10 x 2 = 20

1. List the types of sewing machines.
2. List out the cutting tools.
3. What is the function of thread guide
4. What is draping?
5. What is sponging method?
6. What is seam?
7. Write about godet?
8. Where do you use zipper placket?
9. List out the garments where fitted facing is used for neck-line.
10. What is a shank button? Where do you use it?

SECTION-B

NOTE: (i) ANSWER ANY **FIVE** QUESTIONS

(ii) EACH QUESTION CARRIES **SIX** MARKS 5 x 6=30

11. How do you stitch, hook and eye? Explain.
12. How do you take care of sewing machine?
13. Write about the merits and demerits of paper pattern.
14. How do you straighten the fabric grain?
15. Explain about different types of seam finishes.
16. What is a dart? Explain the types of darts.
17. Write in detail about the standards of a good placket.
18. Differentiate between bias facing and fitted facing.

Model Question Paper

COMMERCIAL GARMENT TECHNOLOGY

I YEAR

PAPER II TEXTILE SCIENCE

TIME:3 Hours Max. Marks:50

SECTION-A

NOTE: (i) ANSWER ALL THE QUESTIONS
(ii) EACH QUESTION CARRIES **TWO** MARKS 10 x 2 = 20

1. Define crimp?
2. What is sericulture?
3. Write about yarn count.
4. Write about knitting.
5. Give examples for twill weave
6. What is a stain?
7. Write about tentering finish.
8. What are the byproducts of cotton?
9. Write about chemical properties of polyester.
10. List any four fabric defects.

SECTION-B

NOTE: (i) ANSWER ANY **FIVE** QUESTIONS
(ii) EACH QUESTION CARRIES **SIX** MARKS 5 x 6=30

11. Explain the physical and chemical properties of cotton.
12. List out any four common stains and their removing agents.
13 .What are novelty yarn? Write any four types of novelty yarn?
14. Explain the manufacturing process of wool.
15. Write about loom & its parts.
16. How do you identify warp knit fabrics?
17. Explain (a) Mercerising (b) Singeing
18. Why rayon is considered as poor man’s silk explain.

Model Question Paper

COMMERCIAL GARMENT TECHNOLOGY
1st YEAR
PAPER III GARMENT CONSTRUCTION

TIME:3 Hours **Max. Marks:50**

SECTION-A

NOTE: (i) ANSWER ALL THE QUESTIONS
(ii) EACH QUESTION CARRIES **TWO** MARKS 10 x 2 = 20

1. What is measuring tape?
2. What is a felt?
3. What is a non-woven fabric?
4. What clothes are suitable for summer season?
5. What is a uniform?
6. What is a high fashion wear?
7. What is a combinational layout?
8. What do you mean by set?
9. What are seam lines?
10. Mention the elements of costing.

SECTION-B

NOTE: (i) ANSWER ANY **FIVE** QUESTIONS
(ii) EACH QUESTION CARRIES **SIX** MARKS 5 x 6=30

11. How do you take body measurements.
12. Discuss about the safety and decorative considerations in children's clothing.
13. What are different fashion fabrics available in the market?
14. Explain the factors which influence clothing choices.
15. Discuss various ways of straightening fabric grain.
16. What are the qualities of a well fitted garment? Elaborate.
17. Discuss any three types of layouts.
18. What is costing? Write the methods of costing garment.