

E- COMPENDIUM
FUNDAMENTALS OF CLOTHING CONSTRUCTION



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CONTENT

- 1. INTRODUCTION**
- 2. SEWING MACHINE**
- 3. SEWING TERMINOLOGY**
- 4. SEWING EQUIPMENT AND TOOLS**
- 5. PREPARATION OF FABRIC FOR GARMENT CONSTRUCTION**
- 6. LAYOUT**
- 7. FACTORS AFFECTING CLOTHING SELECTION**
- 8. FACTORS INFLUENCING CONSUMER BEHAVIOUR**
- 9. CLOTHING REQUIREMENTS OF INFANTS**
- 10. CLOTHING REQUIREMENTS FOR TODDLERS**
- 11. CLOTHING REQUIREMENTS FOR THE PRESCHOOL CHILD**
- 12. CLOTHING REQUIREMENTS FOR THE ADOLESCENTS**
- 13. CLOTHING REQUIREMENTS FOR THE ADULTS**
- 14. CLOTHING REQUIREMENTS FOR THE ELDERLY**
- 15. ELEMENTS OF DESIGN**
- 16. LINE**
- 17. COLOR**
- 18. TEXTURE**
- 19. SHAPE, SPACE AND SILHOUETTE**
- 20. PRINCIPLES OF DESIGN**
- 21. PROPORTION**
- 22. BALANCE**
- 23. RHYTHM**

INTRODUCTION

Sewing is the craft of fastening or attaching objects using stitches made with a needle and thread. Sewing is one of the oldest of the textile arts, arising in the Paleolithic era. Before the invention of spinning yarn or weaving fabric, archaeologists believe Stone Age people across Europe and Asia sewed fur and skin clothing using bone, antler or ivory needles and "thread" made of various animal body parts including sinew, catgut, and veins. Although usually associated with clothing and household linens, sewing is used in a variety of crafts and industries, including shoemaking, upholstery, sailmaking, bookbinding and the manufacturing of some kinds of sporting goods.

Sewing is the fundamental process underlying a variety of textile arts and crafts, including embroidery, tapestry, quilting, appliqué and patchwork. For thousands of years, all sewing was done by hand. The sewing machine device was invented in 1790 by English inventor, Thomas Saint, but he could not advertise his invention. He designed a wooden awl to make holes in leather and canvas, thus allowing a needle and single piece of thread through to hook underneath, and forming locked chain stitches. Josef Madersperger began developing the sewing machine in 1807 and he presented the working machine in 1814. John Greenough patented the first sewing machine in the United States in 1842. Elias Howe created a sewing machine in 1845.

In 1860s, there was a quick popularity of these machines in the middle class section. Later in 1889, the machines run by electricity were designed with motors fixed in them. At first, these were standard machines with a motor strapped on the side. As with the expansion of the power in houses, these became more popular and the motor was gradually introduced into the casing. Later innovations include the ability to make more sophisticated stitching patterns. In the twenty-first century, sewing machine companies have manufactured several type of machines used for different sewing techniques and there are also computerised machines, embroidery machines and special purpose machines manufactured. The latest machines have LCD screens, microprocessors, and pre-programmed fonts

SEWING MACHINE

The basic thought behind sewing machines is to mechanically stitch two or more pieces of material—mainly fabric, together using thread and a needle. Sewing machines reduce the amount of manual sewing in preparing a garment or any other article. Sewing machines help the operator in getting the work done quicker, with greater accuracy and much more consistently.



Various types of sewing machine

TYPES OF SEWING MACHINE

Though there are different types of sewing machine but mainly, three types are considered for sewing, as given below.

1. Mechanical sewing machines

2. Electronic sewing machines

3. Computerised sewing machines

I MECHANICAL SEWING MACHINES

These machines are less expensive and are the simplest type of sewing machines in terms of build. They are the hand-operated sewing machine and treadle sewing machine

Hand-operated sewing machine

1. This is the simplest form of domestic sewing machine which is operated by hand.
2. A handle is attached to the flywheel (See Session 3) which is detachable and is used to operate the machine.
3. A hand-operated sewing machine is generally used for domestic purpose for simple projects as it does not work very speedily.
4. This machine is suitable where there is no electricity supply.

Treadle sewing machine

1. This machine is the same as a hand-operated sewing machine but it is operated by feet, with an additional stand attached to the machine.
2. A belt is attached to the lower stand passing through the balance wheel and driven by feet.
3. These machines run faster than the hand-operated sewing machine.
4. This machine is also suitable for the places where there is no electric supply.
5. When handling the treadle sewing machine, both the hands of the Operator are free to handle the fabric. Hence, this speeds up the work of sewing.

II ELECTRONIC SEWING MACHINE

These machines became popular during the 1970s. There are many more features in an electronic sewing machine than in a mechanical sewing machine.

1. These sewing machines run faster than manually operated machines.
2. In the electronic machines, balance wheel comes to motion by a belt, which is attached to an electric motor.
3. A single motor is attached to the electronic sewing machines and this motor supplies power to the needle.
4. It is essential to control the speed of this machine by putting pressure on an electronic foot pedal.
5. Practice is essential to handle an electric sewing machine.

III Computerised sewing machines

1. These sewing machines are very fast and specific to use.
2. These machines are similar to the electronic sewing machines. However, a computerised sewing machine works with the help of various softwares.
3. Computerised sewing machines allow the Operator to tailor the functions according to the sewing needs. A computerised sewing machine functions very appropriately in designing and stitching various components of the garment like sleeves, yokes, pockets, etc. These advanced computerised machines have an LED display or LCD display or touch screen. They are multi function machines and are expensive.

The following are some other types of sewing machines according to their specific applications.

- (i) Lock stitch machine
- (ii) Chain stitch machine
- (iii) Double chain stitch machine
- (iv) Buttonhole machine
- (v) Button stitch machine
- (vi) Bar-tack machine
- (vii) Feed off arm machine
- (viii) Over-lock machine
- (ix) Blind stitch machine
- (x) Over-edge machine

SEWING TERMINOLOGY

1. **Anchoring stitches**-These are machine stitches that are sewn with zero stitch length, to keep from pulling out. This term can also be used to refer to when you stitch backwards for a couple of stitches, to anchor it.
2. **Applique**-This comes from the French word “appliquer,” which means to apply or put on. In sewing, applique is used to describe the process of applying one kind of fabric on top of another layer of fabric. This is fixed into place by sewing or by another fusing means. It can also refer to a surface embellishment.
3. **Armhole**-The opening in a bodice to which the sleeve is attached; also known as an armhole.
4. **Basting**-Basting stitches are temporary long running stitches, made by machine or hand, that hold fabric together before the final permanent stitching.
5. **Bias** -Bias refers to the diagonal of the fabric; a cut that's made diagonally across the crosswise and lengthwise grain of the fabric. This is a 45 degree angle to the grain line, or diagonal direction of the fabric.
6. **Blanket stitch**-A hand stitch used for finishing a fabric edge.
7. **Buttonhole**-A small cut in the fabric that is bound with small stitching. The hole has to be just big enough to allow a button to pass through it and remain in place.
8. **Casing** -A folded over edge of a garment, which is usually at the waist. It is used to enclose a way of adjusting the fit – for example for a drawstring.
9. **Clip**-To help flatten a curved seam, snip at even intervals along the inner curve, being careful not to cut into the stitch line.
10. **Crossgrain**-The line of fabric perpendicular to the selvage edge of the fabric.
11. **Dart** - A dart is a folded wedge of fabric used to shape a garment, particularly over curves. They normally appear around the waist and bust.
12. **Darn (or darning)**-Usually refers to the repair of a small hole, most often in knitwear, using a needle and thread. It is often done by hand, using a darning stitch. It

can also refer to any number of needlework techniques that are worked using darning stitches.

13. **Ease** -The allowance of space in a pattern for fit, comfort and style, over exact body measurements. For example, a garment with a 40" bust made to fit someone with a 38" bust would have 2" of positive ease.
14. **Edge stitch** -Straight stitching very close to the edge of a seam, trim or outer edge.
This is usually sewn to keep pressed seams in place
15. **Facing** -A fabric piece used to create a finished edge on a garment, mirroring the edge it is sewn to and creating a enclosed edge. Typically used for necklines, edges with closures, or armholes.
16. **French seam** -A French seam is a finished seam in which the seam is initially stitched with wrong sides together, then flipped inside and stitched right sides together. This encloses the seam allowance, creating a clean finish on the inside of the garment.
17. **Face**-The front of a piece of fabric (the *right* side).
18. **Gather** -A way of gathering the fabric to create fullness in the fabric, such as ruffles.
It is a technique for shortening the length of a strip of fabric, so that the longer piece can be attached to the shorter piece.
19. **Grain**-Grain describes the direction of the warp and the weft in a woven fabric. The threads in a woven fabric are set up on a loom in a lengthwise and crosswise orientation. The lengthwise grain is used to lay out the garment pattern pieces. The crosswise grain runs from one selvage edge to the other.
20. **Grain line**-The imaginary line running lengthwise on the fabric, always parallel to the selvage edge. The grain line is marked on pattern pieces with a straight line, usually with arrows at either end, and marked as "grain line" or "straight grain."
21. **Grading** -After a seam is stitched, the two layers are trimmed to a different width in order to prevent a ridge showing on the outside of the garment seam. A second definition of Grading is the process of converting a pattern size to a larger or smaller size.

22. **Hem** -The finished bottom edge of a garment. The hem indicates the edge which is usually folded up and sewn, thus creating a neat and even finish.
23. **Interfacing**-A term for a textile used on the unseen (wrong) side of fabrics. They support and stabilise the fashion fabric of the garment.
24. **Lining**-A piece of material used to finish the inside of a garment. Linings can hide the seam and make the garments easier and more comfortable to wear.
25. **Notch**-The notches on a pattern help align the pattern pieces when you sew them together. Another type of notch is one that is added when sewing the outside edge of a curved seam. These notches are added by cutting wedge shapes into the seam allowance at even intervals, being careful not to cut into the stitching.
26. **Pattern**-A template on paper or cardboard from which all of the pieces of the garment are traced onto fabric. All the parts are then cut out and assembled to create the final piece.
27. **Pintuck** -A narrow, stitched fold of fabric. This style is usually seen in multiples and creates a stylish and smart finish.
28. **Pleat** -A type of fold in the fabric created by doubling the material back on itself and securing it in place. When ironed, they create a sharp crease.
29. **Seam**-The line where 2 pieces of fabric are held together by the thread.
30. **Seam allowance**-This is the width of the fabric beyond the seam line. The standard seam allowance is normally 1.5cm.
31. **Selvedge**-The woven edge of the fabric that runs parallel to the lengthwise grain – also called “selvage.” They are the finished edges that do not fray.
32. **Staystitch** -Stitching placed on or just outside the seamline, stitched on a single layer of fabric. It is used to stabilise the fabric and prevent it from stretching out of shape.
33. **Topstitch** -Topstitching is a row of stitches seen on the outside of a garment. They can be decorative and also add strength and wearing ability to an item.
34. **Under stitch**-A row of stitching that attaches the facing to the seam allowance on the inside of the garment.
35. **Warp**-The lengthwise thread in woven fabric.
36. **Weft**-The crosswise threads in woven fabric.
37. **Yardage**-A term for an undefined length of fabric. Patterns will indicate required yardage needed for a garment in a specific size, detailing how much yardage is needed.
38. **Yoke**-A panel across the shoulders or the waistline.

SEWING EQUIPMENT AND TOOLS

INTRODUCTION

Clothing along with food and shelter has been recognized as integral and inseparable part of mankind in all parts of the world. Historical records shows that primitive people were covering and decorating their body with paints, tattooing, mutilation as well as by fur, beads, stones, wood, leaves and barks etc. This was the first attempt that was made to cover the body. The main function of clothing is to provide protection against climatic extremities, means of self expression, aesthetic enjoyment, conformity, to indicate socio- economic status as well as a source of decoration.

CLASSIFICATION OF TOOLS USED IN CLOTHING CONSTRUCTION

Clothing construction requires a variety of tools that can be classified into the following categories:

- Measuring Tools
- Marking Tools
- Cutting Tools
- Fitting Tools
- Sewing Tools
- Finishing / Pressing Tools
- General Tools

Using the right tool will help make the garment construction easier. These tools help increase the accuracy of the finished product, saves time and also simplify tasks.

MEASURING TOOLS

The following are the commonly used measuring tools for garment construction

- 1. Measuring tape**
- 2. Ruler or Yard Stick**
- 3. L -square or Tailor's Square**
- 4. Hem marker/skirt marker**
- 5. Gauge**

Measuring tape

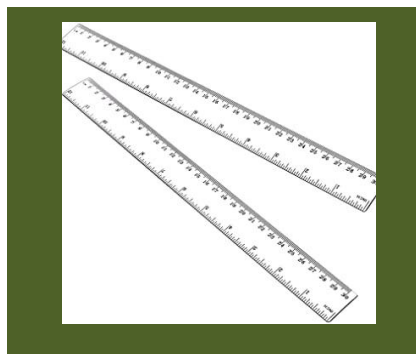
Tape should be of good quality with a smooth surface and with metal tipped ends that prevent the tapes from raveling. At one end of the tape the metal tip is long (3") and is used when vertical measurements are taken. The other end has a short metal tip with a small hole at the centre. This side is used in taking circumference measurements. The small hole aids in drawing circle of perfect measure. Tape is marked with centimeters as well as inches to

facilitate the conversion from one system to another. Generally tapes are of 150 centimeters (60 inches) long. The best tape choice is a flexible synthetic or fiberglass, which will not tear or stretch.



Ruler or Yard Stick

Ruler or yard stick is the best device for taking long, straight measurements on paper. Sticks of good quality and that are smoothly finished should be used. Ruler of 15 cm to 30 cm long and yard stick of 1.5 meter scale marked in centimeters and inches are commonly used.



L -square or Tailor's Square

It resembles the letter L – with perfect right angled corner. It is more accurate than ruler and convenient for measuring skirt lengths or straight lines of material before starting pattern layout. It is made of good quality, light weight, smoothly finished hardwood. Sometimes it is available with French curve, useful to mark corners, perpendiculars and curves of the pattern.



MARKING TOOLS

- 1. Tailor's chalk**
- 2. Marking Pencil**
- 3. Tracing Wheel**
- 4. Dress Maker's Carbon Paper**

Tailor's chalk

Most commonly used dress maker's marking tool is tailors chalk and it is made of either clay or wax. It is available in various colours like white, yellow, blue, red etc with different sizes and shapes which facilitates quick and efficient marking. Wax based tailor's chalk is available in a 2 inch square white colour piece, mainly used for marking woolen fabrics. Tailors chalk is very safe because it does not leave any stain or permanent marking on the material. Light brushing is sufficient to rub off the marked lines completely.



Marking Pencil

These are convenient and precise tools for marking cutting and stitching lines. These are available in white and pastel colours. Since the marking pencil is made of wax, the coloured lines can be removed by simple washing.



Tracing Wheel

It is used with or without dressmaker's carbon paper to transfer pattern marking onto the fabric. Tracing wheel is about 15 cm in length, having a wheel with saw-like periphery, which is connected by means of stem and at the rear end with a convenient handle. Tracing wheels are available in variety of edges 1) Needle-point wheel, makes a faint line that is desirable on fine thin fabric. 2) A serrated edge produces a prominent line that is good for marking heavy, loosely woven fabric, deep points are more effective on thicker fabric 3) A smooth wheel is recommended for delicate fabric such as velvet and knit that are subjected to snagging and are damaged by other types of wheels. Use of tracing wheel in conjunction with a carbon paper is very safe, because it does not leave any coloured markings, but a line of tiny dots remain which are temporary.



Dress Maker's Carbon Paper

By using carbon paper constructional details such as shape of the pattern, cutting and stitching line can easily be transferred on the material. These are available in white and several colours.



Care to be exercised while using carbon paper.

1. No carbon markings should never be placed on the right side of fabric.
2. No lines to be marked boldly.
3. The colour of the carbon must not show through the fabric.
4. If the garment is underlined, marking may be made on the underlining only.
5. White carbon paper is recommended for colour fabrics, because it is removed easily during cleaning.

CUTTING TOOLS

Scissors and shears are the important tools to the dress maker. Various types and sizes of scissors and shears are designed to perform different constructional work. Common working principles of scissors and shears are similar but their application is different. Visually one can easily differentiate scissors and shears - shears have one finger ring bigger than the other for better grip while cutting thick or several layers of patterns. Whereas scissors have identical round finger rings. A separate pair of scissors or shears should be kept for cutting the cloth and the paper pattern.

The following types of shears and scissors are used in clothing construction.

1. **Shears**
2. **Scissors**
3. **Rotary cutter**

SHEARS

1. **Dress making shears**
2. **Bent-handle shears**
3. **Electric shears**
4. **Pinking shears**
5. **Serrated blade shears**

Dress making shears

Dress making shears are heavy duty scissors which are designed specifically with the needs of seamstresses in mind. The distinguishing feature of dressmaker's shears is that the handle is offset from the blades, allowing them to be used to cut fabric against a flat surface without distortion. In shears, one of the finger rings is typically larger than the other. In industrial terms, the finger rings on scissors and shears are known as "bows". The large bow of a shear is usually on the side of the blade which points towards the floor when in use. The length of the blade varies from 25 to 30 cm.

The edges of dressmaker's shears are typically ground with a beveled edge and they are extremely sharp. It is important to keep shears, sharp to avoid mangling of the fabric, as specially while cutting multiple layers of fabric at a time for efficient cutting.

Dressmaker's shears are not symmetrical, as they are available in both right and left-handed versions to facilitate comfortable use. It is important to use dressmaker's shears which are engineered for dominant hand, as it reduces the risk of injury and makes work more comfortable. It is also a good idea to try out a pair of shears before use, to make sure that they are comfortable in handling. shears are available in different materials from heavy brass to very light weight materials. Some have rivets at the crossing of two blades.



Bent-handle shears

These shears have straight blades with a handle that is off-set at an angle allowing the lower blade to stay flat on a cutting surface. The design of the handle allows the bottom blade to rest on the flat surface below the fabric without lifting the fabric from the flat surface. The blade size is less than 15 cm long. Sharp shears are the key to prevent hand fatigue and accurate cutting along pattern lines.



Electric shears

These are used in most sample rooms. Electric shear is a type of hand tool suitable for a variety of cutting applications. They are essentially battery-powered shears. Electric shears are also known as power scissors or cordless scissors. They resemble a utility knife with dual crossing blades on the end rather than a single blade, but a few models are designed slightly different. Most varieties are powered by alkaline batteries, but a few are powered by rechargeable batteries. They are ideal for cutting silk, nylon, and soft, hard-to-cut fabric.

Pinking shears

They produce a notched cutting line (zig zag) which gives a neat appearance to the inside of garments, as these shears have saw tooth blades.

These shears are used for pinking seams or decorative edges on felt, suede, chintz, etc. They are used to add a ravel-resistant seam finish to loosely woven fabric. It automatically notches and reduces bulk in seams and creates a decorative finish. Blade lengths range from 7" to 10 1/2" and are available in lightweight models, as well as scalloping shears for a more rounded effect.



Scissors

Scissors are hand operated cutting instruments. They are 5 to 6 inches long, used for light cutting, trimming, clipping corners and cutting curves. They are designed for snipping threads and trimming seams. They are also used for cutting various thin materials, such as paper, cardboard, metal foil, thin plastic, cloth, rope and wire.

1. **Embroidery scissors:**

These are light weight cutting scissors with 3 to 4 inches in size with narrow blade tapering into two sharp points. Blades are joined by a pin, screw or rivet and designed with two evenly sized ring handles. These scissors are ideal for clipping and notching, trimming fabric from delicate appliqués, embroidery and snipping thread tails.



2. **Button hole scissors:**

These scissors are adjusted to cut button holes of required length. They are greatly used when many button holes are to be made. Buttonhole scissors have a special adjustable screw for securing them partially open as per the length of buttonhole required. This open position translates to a precise cutting length (usually between 1/2" and 1 1/4") that prevents cutting of the stitches at the buttonhole end.



3. **Trimming scissors:**

These are used for trimming or clipping seams and cutting corners, and are generally 15 to 17.5 cm long with narrow blades and tapered sharp points.



4. **Snipping scissors:**

These are spring-action clippers with or without a finger loop featuring very short blades for cutting thread tails and clipping seams quickly.



Care guidelines while using shears and scissors:

1. Take long strokes using the length of the blades.
2. Do not use fabric-cutting scissors for cutting paper or other non fabric materials.
3. Wipe scissors with dry cloth after each use. This is especially important after cutting polyesters and other synthetics, since lint from these manmade fibers is abrasive and can dull the blades.
4. Keep the cutting blades sharp. Scissors and shears may be sharpened using a professional-style electric sharpener or they may be sent to a professional sharpening service.
5. Occasionally oil the pivot screw with a tiny drop of sewing machine oil. Open and close the blades few times, then wipe the blades with a soft cloth.
6. Don't force a cut -this can deform the blades or spread them permanently.
7. Store scissors or shears in a box or pouch.
8. Never drop shears on the floor, it loses its sharpness.

Rotary cutter

This tool helps in cutting more than five layers of cloth at a time. It is electrically operated having a round circular shaped blade with a guard in the front of the blade. It is generally used in small garment manufacturing units. There are several sizes and types of rotary cutters available. Blade sizes range from 18 mm to 60 mm in diameter. Smaller diameter blades make cutting out curves and details much easier; whereas the larger-diameter blades make quick work of long, straight cuts.



FITTING TOOLS

French Curve / Tailor's Curve: The main function of the curve stick is to give shape especially at neckline, arm hole, waist, crotch etc. It is made up of good quality wood or plastic with shaped curves marked in inches. Sometimes it is also used for measuring the length of the curve that is shaped.



SEWING TOOLS

The correct selection of sewing thread and needle prior to garment assembly is essential in order to achieve required finish to the garment.

The importance of thread and needle is often underestimated though fundamental to garment construction i.e. forming of stitches and subsequently joining of seams. Without hand and machine needle the construction work is incomplete. Clothing industry has demanded the development of threads and needles of various sizes and shapes to cope up with advanced technology at which the garments are manufactured with minimum machine troubles.

1. Needle
2. Sewing threads
3. Sewing aids

Needle

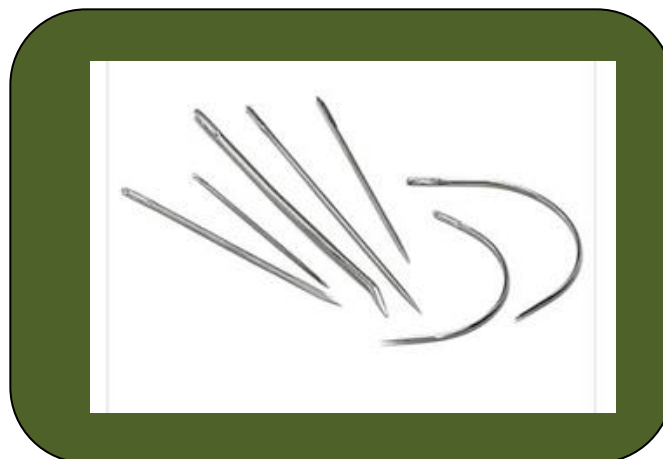
Needles are classified as follows

1. Hand sewing needles
2. Machine sewing needle

1. Hand sewing needles

A hand sewing needle is a long, slender steel shaft, with an eye at one end. The shaft tapers to a fine ball point tip or wedge end. These needles function to carry the thread through the fabric while hand sewing. Needles are designed in a variety of sizes, types, and classifications developed according to specific use.

For each needle type, sizes range from a low number, (coarse needle) to higher number (finer needle). Diameter of the needle shaft increases proportionately at the eye end according to the length and size.



Hand needles are selected according to the following factors

1. Structure of fabric
2. Weight and type of fabric
3. Type of thread
4. Size and weight of thread and
5. Intended use

The needles available for hand sewing are specified below

1. Ball point needle

A needle is designed with a rounded tip and a small round eye, designated as medium length, sizes range from 5 to 10 for knits and lingerie fabrics. Ball point needle slides between the yarns instead of piercing as it penetrates the fabric. It reduces occurrence of holes and runs in fabrics such as jersey and tricot.

2. Ball point needle

This needle is very fine, long with a small round eye used for beadwork, sewing sequins, pearls, etc.

3. Betweens

A needle designed with a small rounded eye and designated as short length; sizes range from 1 to 12 to produce short fine stitches as in tailoring, handwork and open work

4. Crewels/embroidery

A needle is designed with a long oval eye and designated as medium length; sizes range from 1 to 12 to carry multiple strands of thread for embroidery.

5. Chenille

Large-eye needle with sharp point for ribbon embroidery,

6. Darners

A coarse needle designed with a large, long oval eye. Designated as long length, the sizes range from 14 to 18. It can carry multiple strands of thread for weaving on loosely woven woolen and open weave knit fabrics.

7. Sharps

A needle with a small rounded eye and of medium length is called the sharp. Sizes range from 1 to 12. These are general purpose needles with sharp point for sewing and appliqué

8. Tapestry

Large-eyed needle with a blunt point for cross stitch, needle point and for stitching knitted items.

2. Machine sewing needles

Sewing machine needles are made up of steel. They are manufactured in different sizes and types for both industrial and home sewing machines. Size range from fine to coarse and are chosen with regard to interaction of yarn of the fabric and size of thread. Higher numbers indicate thicker points and coarser needles. Needles are standardized and classified with regard to the type and model number of machine on which they are used.



There are many different kinds of needles among which majority of sewing needles are listed below

1. **Ball-point needles** are used for sewing knits and meshes. The rounded tip of this needle passes between the fibers of the fabric.
2. **Sharp-point needles** are used for sewing fine woven fabrics. The pointed, sharp tip pierces the fibers of the fabric.
3. **Universal point needles** can be used for sewing both knits and woven's. It is an excellent needle for general sewing use.
4. **Denim needles** are used for sewing heavy, dense fabrics such as denim.
5. **Leather needles** have a wedge-shaped tip for punching through leather, even for heavy vinyl and similar fabrics. Care should be taken while sewing with these needles as they leave large holes on removal of stitches.

Sewing threads

Sewing thread is an integral component of the garment though it is often invisible. Typically, the cost of thread is less than 5% of the retail selling price of the garment but 50% of the responsibility of the garment's performance is dependent on sewing thread.

A wide variety of threads from cotton, polyester, polycot to rayon are available for varied uses. It is customary to use cotton thread or cotton materials and polyester or polycot thread for synthetics. Rayon threads are used for embroidery work.



SEWING AIDS

DRESSMAKER'S PINS:

Comes in different sizes for use in different fabrics for holding of fabrics together temporarily before machining. These are long slender pins with highly polished finish and a fine tip for easy

THIMBLE:

A sewing thimble protects the middle finger of the right hand while hand sewing. Helps to push needles through the material being sewn and to prevent fingers getting pierced by the needle



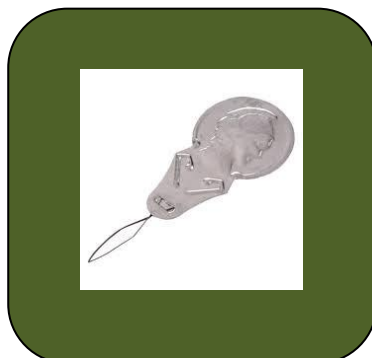
SEAM RIPPER:

A seam ripper is used to remove and pick out unwanted stitches/threads. The fine tip of a seam ripper picks out single thread and cuts it.



NEEDLE THREADER:

It can be used for both hand and machine needles to push the wire through needle eye.



FINISHING/ PRESSING TOOLS

Once the garment is constructed, it is subjected to neatening through trimming and pressing. Pressing is important at every stage of stitching, because poor pressing can destroy the appearance of a well constructed garment. In addition to the sewing tools and sewing machine, good pressing equipment is also essential.

- 1. Iron**
- 2. Iron board**
- 3. Sleeve board**

IRON

There are different types of irons available in the market like flat iron, thermostatic, automatic, non automatic, charcoal, steam iron etc. Among all, the thermostatically controlled or automatic electric irons are the best, in which the temperature can be adjusted to various types of materials. These are most convenient for general purpose and home ironing. Irrespective of types available in the market one should remember to keep base of the iron very clean and follow the guidelines given by the manufacturer while using.



IRON BOARD

Ironing boards can be free standing or mounted depending on the available space and frequency of use. Good padding should be provided to cover the base and it should be made from a natural fiber fabric like cotton or wool for best pressing. Foam pads are available for most ironing boards but they do not allow moisture absorption. A thick soft padding on the ironing board gives better results.



SLEEVE BOARD

A sleeve board allows pressing of narrow garments sections such as sleeves and trouser leg. The ideal sleeve board must be strong, stable and have sufficient space between the board and the base so that fabric does not crease in working. It is ideal for pressing necklines, shoulder seams and small hard to reach areas like pockets, belts, loops as they can be spread on this board without stretching or wrinkling the rest of the garment.



GENERAL TOOLS

PIN CUSHION: Pin cushions are useful to store needles before and after they are removed from the fabric. They can be made at home by using soft fabric and filling it with hair instead of cotton wool. Some pin cushions have an emery pack for cleaning and sharpening pins and needles, and some cushions can fit on the wrist for handy use. Pin cushions are available in a variety of styles like a tomato pin cushion, a wristband pin cushion and magnetic type.

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

LOOP TURNER: It is a long wire with a latch hook, used for turning bias strips to make spaghetti straps and narrow belts.

BODKIN: It is used for drawing elastic, cord or ribbon through a fabric casing. They are basically large needles with large eyes meant for easy threading.

ORANGE- STICK: This is a long tool whose point can be inserted into the corners of collars, seams, etc., so as to give a neat pointed appearance.

STILETTO: This is a pointed metal with a wooden handle and is used to make eyelet holes or openings.

DRESS FORM: It is a padded form of body and may be made of wood, cardboard, plaster, reinforced plastic. It is an essential necessity in all sample rooms for designing and fitting.

PREPARATION OF FABRIC FOR GARMENT CONSTRUCTION

Market is flooded with varieties of fabrics due to advanced technology in the field of textile and apparels. Before buying fabrics, a buyer should always look into any flaws in the fabrics *viz.* yarn alignment, even width throughout the yardage, and type of finish used. After the fabric is purchased and before cutting and sewing process, the following two procedures must be undertaken in order to avoid any deformities during construction.

Preparation of fabric for cutting

- 1. Preshrinking**
- 2. Straightening of fabric grain**
- 3. Grain and its importance in clothing construction**

1.PRESHRINKING

Preshrinking is a process that is carried out prior to cutting a fabric in order to ensure that garment does not shrink in its dimensions. The textile materials usually undergo significant lengthwise stress during the weaving and finishing process. This results in considerable shrinkage during subsequent use because of the corresponding relaxation forces. Shrinkage occurs in almost all natural fibers and also blends. Before laying out the paper pattern pieces, one needs to preshrink the fabric and straighten the grain. These two simple steps ensure easy-care garments with straight hanging seams and hems.

- 1. Preshrinking for washable fabrics**
- 2. Preshrinking for non washable fabrics**

1. Preshrinking for washable fabrics

When a fabric is purchased, it is a good practice to take note of the care instructions printed on the fabric bolt; sometimes a printed care label is also available with the fabric purchase.

Points to be considered for preshrinking

- It is important to preshrink all the elements of the garment, including the zipper, lining and interfacing.
- Brightly colored fabrics (red or dark black or navy) need to be pre-shrunk separately as the colors may bleed.
- If color continues to run, add three tablespoons of vinegar to the wash water to help set the color.

Preshrinking woollens: Prepare the fabric for preshrinking by evening and straightening it and basting ends and selvages together. The home process involves rolling the woolen in a wet sheet and allowing it to remain for about eight hours and then pressing the fabric. Pressing is a process by which the iron is lifted up and down on the fabric in a series of up-and down movements that progress in the direction of the lengthwise and crosswise threads.

Sponging the wool cloth: ‘*Sponging*’ partially shrinks wool cloth, removes wrinkles and straightens grain. It is also referred as ‘London shrunk’. The process involves steam pressing the folded fabric and pulling in the direction of bias from the short corners, in order to straighten the grain. This fabric is then pinned to a cutting board and steam pressed. Using a wet cheese cloth will provide extra moisture for pressing.

Preshrinking for non washable fabrics

For fabrics that are to be dry-cleaned only, the yardage should be dry-cleaned or steam shrunk. Before trying to steam shrink, a corner of the fabric should be tested, to make sure it does not show water spots.

1. Dampen either the fabric or a press cloth, and steam press directly on the press cloth over the wrong side of the fabric until it is dry.
2. Lay on flat surface to dry (Do not hang it up).
3. Press lightly on wrong side.
4. Once the fabric is preshrunk, press to eliminate the wrinkles. Make sure the center crease, created by the manufacturer’s fold, is pressed out. If it cannot be eliminated, work around it when laying out the pattern pieces.

Note: To determine if the fabric has a tendency to shrink, cut a 2"-square swatch of the fabric. Wet the square, and then press it dry with a steam iron. Draw a 2" square on paper and lay the dry fabric swatch over it. If the swatch fills the box, the fabric has not shrunk.

STRAIGHTENING OF FABRIC GRAIN

Woven fabrics especially of lower quality are often slightly “*off grain*”, it means lengthwise and cross wise threads are not completely perpendicular to each other. To make sure that the lengthwise and cross wise threads in the fabric are at right angles to each other, referred to as “*on-grain*”, it is necessary to straighten one of the cut ends.

1. Checking the grain in woven fabrics

2. Methods of straightening woven fabrics

1. Checking the grain in woven fabrics

Fabric grain refers to the direction in which the threads run parallel to selvedge. It is important for the lengthwise and crosswise threads to meet at right angles otherwise the garment will twist or hang leading to an unbalanced garment.

The threads that are parallel to the selvage and have little or no stretch. On a garment, the lengthwise grain usually runs vertically from the shoulders to the hem. In the crosswise grain,

or cross grain, threads run across the width of the fabric at right angles to the selvage. These threads stretch more than lengthwise threads. Occasionally garments are cut on the cross grain for some decorative effects. The “*bias*” runs diagonally across the lengthwise and crosswise grains. The “*true bias*” is at a 45 degree angle to the lengthwise grain and cross grain and has inherent stretch, even on firmly woven fabrics

When the fabric is cut from a bolt, it is natural that the cut end is not on one single crosswise yarn and so the fabric edge has off grain. This needs to be corrected in one of the following ways:

2. Methods of straightening woven fabrics

1. Pull The Thread From Selvage To Selvage

This method is appropriate for loosely woven fabrics.

1. In woven fabric one filling yarn is carefully pulled until the fabric puckers.
2. Cut along the puckered line to the pulled yarn.
3. Repeat the pulling and cutting process until the opposite selvage is reached.
(Figure 6.2)

2. Cutting Along A Prominent Filling Yarn /Print Line

When a filling yarn is readily visible the fabric may simply be cut from selvage to selvage.

1. This method can be used for a striped or plaid fabric with lines that run along the crosswise grain. The stripe or plaid must be *woven* into the fabric.
2. Cut along one of these lines from one selvage to the other, close to the cut edge of the fabric.

3. Tearing

This method is appropriate for tightly woven fabrics. Loosely woven fabrics may stretch out of shape with this method.

- Clip into the selvage near to the cut edge of the fabric.
- Tear the fabric all the way down to the opposite selvage. (Figure 6.3)

Sometimes the fabric may have warp and weft yarns perpendicular to each other but during finishing process, they would have been disturbed. In such cases the following can be done:

Stretching method: The simplest method of making a fabric grain perfect is by stretching it. Open up the fabric, keep it near the corner of a table and pull it on the true bias. After pulling for some time, fold the fabric and check for grain perfectness. This process may have to be repeated several times.

Steam press method: If the above mentioned method does not work, clip the selvages at intervals, sprinkle water on the fabric and press with a hot iron in the appropriate direction till the fabric become grain perfect.

Immersion method: This is the most effective method for straightening washable fabrics. The fabric is folded lengthwise and the selvages are tacked together. It is then immersed in water until completely wet, and excess water is squeezed out. The fabric is hung up, till it is half dry. The half dry fabric is placed near the corner of a table and stretching process is carried out to make it grain perfect. After straightening, it is kept on a flat surface and dried. When dry, press with an iron, remove the tacking stitches along the edges.

Note: If a printed fabric is off-grain the fabric grain can be straightened but not the print. Hence it is necessary to carefully inspect print of the fabric before purchasing. It is better to avoid any printed fabric that is badly off-grain.

GRAIN AND ITS IMPORTANCE IN CLOTHING CONSTRUCTION

Grain is the direction of the yarns in a fabric. Grain can be lengthwise grain, crosswise grain, and bias. Grain is very important when constructing garments since it determines how a garment will hang, fit and appear. All fabrics that are made up of yarns have grain or direction. Technically, the term grain only refers to woven fabric while the term direction is frequently used with knit fabrics

All fabrics made from yarns are '*grain perfect*' after knitting and weaving. Looms and knitting machines construct fabrics in a grain perfect manner. However, a fabric can become off-grain during the processes of finishing (dyeing, printing, permanent finishing, and/or packaging, winding onto a bolt). Garments that are not cut and sewn according to the fabric grain can stretch in places they should not, have sagging hems and be uncomfortable to wear. Patterns are specifically designed with grain in mind so that the body can take advantage of the amount of stretch or lack of give in the fabric.

1. Woven Fabric

The lengthwise yarns (sometimes called the warp) run parallel to the selvage edge of the fabric. They are usually more tightly twisted, stronger, and more stable than the crosswise yarns.

2. **Selvage** – the firm edge along the lengthwise direction of a woven fabric.

The crosswise yarns (sometimes called the woof, weft, or filling) are perpendicular, or at right angles to the selvage. They are woven under and over one or more yarns to create the fabric. These yarns are usually somewhat more loosely twisted and weaker than the lengthwise yarns.

3. **Bias** is any diagonal direction on a fabric. The fabric will 'give' or stretch.

4. **True bias** is the 45-degree angle or middle between the crosswise and lengthwise grain. Fold the fabric so lengthwise and crosswise yarns lie on top of and parallel to each other. This is where a woven fabric will have the greatest stretch. True bias is

used for bindings, facing, pipings, folds, cords etc. It equally severs both warp and woof threads.

5. **On grain print** is a fabric wherein the prints on both the crosswise and lengthwise yarns run at right angles. This kind of fabric has perfect right-angled corners and is said to be 'grain perfect'.

6. **Off grain print** is a fabric which does not show perfect right-angled corners and the lengthwise and crosswise lines/print does not run at right angles. Such kind of off-grain printed fabrics are difficult to sew because it is impossible to match the seam lines, at centre front, at centre back and at shoulders.

7. **With the grain** When the edges of yarns along a bias cut edge tends to close up compactly when stroked with fingers, it is referred as with the grain. While working with a bias edge, it is better to work *with the grain* to avoid stretching or raveling.

8. **Against the grain** When the edges of yarns along a bias cut edge tends to fray or come apart when stroked with fingers, it is referred as against the grain.

9. **Garment Bias** Any slanting line or cut in a garment that is not at 45 degree angle is referred to as garment bias. Basically a bias cut in cloth is a slanting or diagonal severing of the material. Both warp and woof threads will be cut.

LAYOUT

Once a design is finalized, the next step is to construct it. The various steps involved in garment construction include pattern making for the chosen design, fabric estimation, layout on fabric, cutting, assembling, stitching and finally finishing. The main advantage of a pattern layout is that it minimizes fabric wastage, thus helping to optimally utilize the fabric.

A layout can be defined as a methodical arrangement of various pattern pieces on the fabric. The main objectives of a layout is

1. To ascertain if the fabric bought is sufficient for the design planned.
2. To minimize fabric wastage
3. To optimize the use of fabric

RULES TO REMEMBER IN PATTERN LAYOUT

- Press the fabric before laying it out on the table.
- A large table is useful for comfortably laying out all the pattern pieces.
- For an open layout (where single thickness of fabric is used) place the fabric with the right side up.
- For all other layouts, fold the right sides facing each other so that the wrong side faces seamstress.
- If a combination fold is used, lay and cut the lengthwise pattern pieces first before refolding the cloth for crosswise layout.
- Since most garments are made with the lengthwise grain running vertically on the body, align the pattern pieces on the fabric accordingly, with the grainline of pattern parallel to the selvage.
- Pin all the pattern pieces to the fabric. Use only dressmaker's pins as they do not damage the fabric. Pins should be perpendicular to the stitching lines and the cutting line.
- Place large pattern pieces first and then fit in the smaller ones.
- Lay the pieces as close to each other so that fabric is not wasted.
- Fit pattern pieces that are similar in shape next to each other. This process is called **dovetailing**.
- Always test out to see if all the pattern pieces fit into the fabric being used.
- Mark seam allowances on the fabric if the pattern indicates so.
- If pattern details are being transferred using a carbon paper, use a paper that is as close to the color of the fabric as possible.
- Mark pattern details only on the wrong side of the fabric.
- Keep the fold lines of patterns on the folded edge of the cloth.
- When using a lining material, mark only on the lining than on the actual fabric the garment is made.
- Try to fit the wide end of one piece to the narrower end of the other. Ex: petticoat layout.
- Arrange all pattern pieces before cutting the cloth.

PRECAUTIONS TO BE TAKEN WHILE CUTTING

1. Use sharp shears with long blades and use long smooth strokes while cutting instead of smaller ones.
2. Cut accurately on the pattern cutting line.
3. Hold the pattern flat with one hand as you cut with the other. Do not lift fabric off the table or cutting surface while cutting.
4. Cut out notches. These help in aligning the pattern pieces during assembling.

If careful attention is given to pattern layout, cutting, and marking, then it will ensure:

1. A garment that is on grain
2. The same color or shading for all garment pieces
3. A balanced design.

COMMON METHODS OF FOLDING THE CLOTH FOR LAYING

Fabrics can be folded in various ways to accommodate the pattern in an economical way. The choice of a layout is dependent on the following factors:

- Type of the dress design
- The size of the pattern
- The width of the fabric
- Nature of the fabric (checks, plaid, napped, one way design, striped etc)

Accordingly a suitable layout is to be selected from among the different types of layout:

Lengthwise Fold -One of the easiest layouts to work with is the lengthwise fold. Here the fabric is folded in the same way it was folded when purchased. In other words, the selvages are matched together and folded, so the fold runs parallel to the selvedge. This type of layout is suitable for a child's frock.

Off Center Lengthwise Fold- This fold is useful when the pattern pieces are too wide for a lengthwise fold. To make this fold, spread open the fabric; refold on a line at right angles to the selvages in the direction of crosswise threads. To cut narrow patterns pieces on fold, this layout is very useful. A child's panty can be laid out in off centre lengthwise fold.

Crosswise Center Fold- This layout is suitable for cutting out the materials that are too narrow to be accommodated in width when folded lengthwise.

Off Center Crosswise Fold- The cloth is folded along a crosswise yarn or weft yarn so that only a smaller amount of fabric is utilized. This layout is also suitable to cut pattern pieces that are too wide for a lengthwise fold. The only advantage over crosswise centre fold is that only a part of the fabric is used up.

Double Fold- Used when many pattern pieces are to be cut on fold. In this type of fold, the two selvages meet at the centre of the fabric. Garments that have no openings either at front or back can be cut on this type of fold provided the fabric is wide enough to accommodate the pattern pieces. fabrics with widths ranging from 50" to 60" or more are suitable for this type of layout.

Combination Fold -This type of layout combines both lengthwise and crosswise fold. The fabric is first folded lengthwise and then crosswise to arrive at this type of fold. A saree petticoat or a four gored skirt can be cut using this type of layout.

Open Layout -The fabric is laid out on a single thickness and then the patterns pieces are arranged suitably. This type of layout is especially suitable for asymmetrical dress designs. Ex: Wrap over top with ties at the right or left side.

SPECIAL LAYOUTS

- 1. Stripes**
- 2. Plaids or checks**
- 3. Napped / pile / one way prints / fur / satin**
- 4. Border prints**

1.Stripes

Stripes can either be printed or woven, balanced (Even) or unbalanced (Uneven), horizontal or vertical. There could even be diagonal stripes as well. A balanced stripe has a regular repeat of color bars and spaces. It repeats the pattern, as the most dominant stripe, from left to right and above and below a center bar. A unbalanced stripe has an irregular repeat of color bars and spaces. It varies in spacing or color from left to right and/or above and below a center bar. Horizontal stripes go around the body while vertical stripes move up and down the body.

It is easier to work with balanced stripes. Unbalanced stripes require greater care while matching the pattern pieces and seams. Variety in striped dresses can be brought about by '*chevron effect*'. A chevron effect can be achieved by cutting the striped fabric on bias. Striped fabrics change the silhouette and create an illusion. Horizontal stripes tend to shorten, whereas vertical ones add height. Extra yardage is often needed for matching stripes. A general rule is to allow $\frac{1}{4}$ metre to $\frac{1}{2}$ metre extra fabric for matching stripes.

RULES TO REMEMBER WHILE WORKING WITH STRIPES:

1. Locate the prominent stripe and place it on the centre front or centre back of the bodice, centre of sleeves, centre front or centre back of skirt or collar.
2. Match the stripes at - centre front, side seams, the front of sleeves to the bodice, shoulder seam. Match seams from hem to the waist and bottom of the bodice to the top.
3. Match collars at the shirt back or at the back of a jacket.
4. Match the skirt of the bodice to that of the skirt.
5. Lay the stripes at equal angles to a bias line so that these stripes form a regular 'V' or chevron.
6. Balanced striped fabrics can be folded lengthwise taking care to match the stripes.
7. Unbalanced stripes have to be laid out like that of "with nap layout".
8. A simple pattern works out better for striped fabrics rather than a complicated one.

PLAIDS OR CHECKS

A plaid is a design composed of a planned series of vertical and horizontal stripes or bars that intersect at right angles. Plaids require careful planning and fabric handling. Plaids can be printed, woven or knitted. Various types of plaids that are available in the market can be even or uneven.

An even (balanced) plaid has the same lines, spaces, and colors on the left and right below a center or dominant line. They will match in both the lengthwise and crosswise directions. An uneven (unbalanced) plaid can be one of four types:

- Different from left to right of a dominant line.
- Different above and below a dominant line.
- Different from left to right and above and below a dominant line.
- Different from crosswise to lengthwise whereby the plaid is even right to left and/or up and down.

RULES TO REMEMBER WHILE WORKING WITH PLAIDS/CHECKS:

1. Identify the dominant vertical bar/line of the plaid. Place this as the center front, center back, and center sleeve area. This will help balance the design on the body.
2. Avoid placing a dominant horizontal bar in any area that is not to be emphasized, as the eye will be attracted to this area.
3. Uneven plaids are best worked on a single layer while even plaids can be folded during layout. Use only '*with nap*' layout for uneven plaids.
4. It is better to work on a single layer for laying out the pattern pieces, but if a folded layout is required, then pin both the layers at 4" intervals so that they do not move while cutting.
5. Match the plaids at seamline, not at the cutting line. Marking notches help in matching the pieces.
6. Small areas of the garment such as collars, cuffs, pockets, yokes or the "lips" of bound buttonholes can be cut on the bias for creating interest in the design.
7. For perfect matching at all seams, Slip-basting can be done with the right sides of both fabric pieces facing the seamstress.
8. Extra yardage of about $\frac{1}{4}$ metre to $\frac{1}{2}$ metre is required for matching the checks or plaids.

NAPPED / PILE / ONE WAY PRINTS / FUR / SATIN

The term '**nap**' refers to the raised surface on the fabrics that have undergone napping treatment. They can either be woven or knitted. Examples of napped fabrics are flannel, serge etc. Napped fabrics are soft to touch, heavier and are warmer, hence preferred for baby's clothes. The raised fibres of napped fabrics lie in one direction and feel and look different when viewed from different directions. So it is important to have the nap running in the same direction on all the pattern pieces.

Pile fabrics are woven with an extra set of warp that forms a loop on the surface of the cloth. This loop may be cut or uncut. Examples of pile fabrics are: velvet, corduroy, terry cloth etc.

They might appear light and shiny when brushed in lengthwise direction and dark when brushed in the other direction. To avoid a two toned look in the garment a '*with nap layout*' should be planned.

ONE WAY PRINTS are printed fabrics with the prints running in only one direction. Motifs should be placed in such a way that they flatter the wearer. These fabrics also require special handling and a '*with nap layout*' is generally recommended.

SATIN FABRIC reflects light differently in different directions. Hence 'a with nap layout' is preferred for cutting satins. All the pattern pieces must lie in the same direction so that light reflects equally and fabric color appears uniform. For all the above mentioned fabrics, extra fabric is required to allow for matching of the nap.

RULES TO REMEMBER WHILE WORKING WITH NAPPED/PILE/ONE WAY PRINTS:

1. Identify the direction of the nap by brushing with the hand. If it feels soft, then one is brushing *with* the nap. Video clip from you tube
2. The nap should run down the garment, from the top down toward the lower hem. This feels softer, and the fabric tends to pill less and wears better. When the nap runs up, the color is richer.
3. Lay all the pattern pieces so that they run in only one direction.
4. If the fabric is to be folded crosswise, fold with the right sides together, cut open and rotate the top layer 180° to keep the nap direction consistent.
5. Outerwear fabrics with heavy and longer surface fibers, such as fleece and camel's hair, should be cut with the nap running down, so the pile is smooth and the garment repels moisture better.
6. Short-nap fabrics, such as corduroy and velour, can be cut with the nap running up to achieve a richer, deeper color and a more interesting texture.
7. For design interest certain pieces like patch pockets and yokes, can be cut in different directions to create shading.
8. If the design demands facings, cut them from light weight fabric.
9. Simple designs showcase the napped fabrics better.

BORDER PRINTS

Borders are usually seen on the selvages. Patterns are placed in crosswise grain if the borders are desired on the hem. Care should be taken to match the motifs on the borders along the seams. A single thickness of the cloth is used for laying out the pattern pieces on a border printed fabric.

FACTORS AFFECTING CLOTHING SELECTION

The clothes are considered as most visible component of the personality of an individual and are judged repeatedly to assess the characteristics of an individual. The first impression formed prior to the verbal communication affects the success of an individual in this highly competitive society. It is also called surface language, which is a pattern of instant impressions conveyed by appearance. The clothing, facial expression, grooming, gestures, the way one carry one selves, all form an impression others receive by non verbal communication as first impression.

As a surface language, the clothes can be used to communicate, to motivate, to attract, to separate, to show rebellion in the family, peer group or the society. So the selection of clothes by an individual should be done critically to project desired characteristics of the self. The choices of an individual for the clothing is are regulated by number of factors. These factors are as follows:

1. **Social factors**
2. **Economic factors**
3. **Psychological factors**
4. **Technological factors**

1. Social factors

1. **Population changes:** The changes in the population has taken place owing to the following:
 - better health services; the total population is increasing
 - shift in population; migration of the rural population to the urban areas in search of job (local migration)
 - proportion of the people of different age groups
 - decrease in size of family; nuclearization of the family
 - Migration of the people to different countries for higher education and better job prospects has led to creation of multi cultural societies (cross border migration)These changes in population are creating more demand for clothing overall, specific clothing for different age groups, occupations and various activities and global designs and styles in the clothing.
2. **Family location:** The locale where the family resides, affects the type of clothing and the amount of money spent for clothing purchases. The families residing in urban areas have better excess to the clothing articles in the markets, their activities are different and have better awareness of clothing items in comparison to rural families. Hence the wardrobe of urban families are different than those of rural families in terms of:
 - Type and quality of clothing and accessories
 - Quantity of clothing and accessories
 - Variety in clothing and accessories
 - Frequency of purchasing clothing and accessoriesBeside this, the cultural region (Muslim/ Hindu/ Christian/ east/ west) and the geographic location (tropical/temperate) where they are residing affects the choice for different types of clothing.

3. **Occupation:** The type of occupation in which a person is involved affects the specific clothing he requires at the work place. Usually the clothing of work place differs from that of the general clothing. Also some occupations call for specific clothing for identification of different hierarchical levels as well as the required protection at the work site. So the person has to maintain different types of clothes for general use and for work place.
4. **Family mobility:** The movements of the families from one place to other affect the clothing practices of the family. Today the mobility of families has increased owing to the job requirements. Some jobs require a person to move from one place to other to continue it, like in army or bank sector while other jobs require movement due to shifting as in MNCs or pvt. Sector. This instability in place of residence sometimes forces the family members to have a limited wardrobe as well as their mobility to different place might require them to purchase region specific garments.
5. **Housing changes:** The availability of the convenience facilities in the house affect the types of clothes used by the family members. The air conditioning facilities in houses has increased the use of all weather clothing instead of season specific clothing in the families. Also the structure of houses has changed a lot. Adequate storage facilities are available in all the households; this has enabled family members to have different types of clothes according to the seasons as well as for different activities.
6. **Family size and cycle:** The position of the family in the family cycle decides the size as well as its composition i.e., the number of family members and their age group. The family members of different age group have varied requirements for clothes and the number of members in family affects the per capita budget for clothing.
7. **Social role and status:** The social role of a person in the society is regulated by its age (child, adolescent, adult, elder), the position in the home (child, sibling, spouse, parent, grandparent) and designation at the work place (Owner-employee, manager-supervisor-worker) or in the organization (executive body member/ general body member). Every role has a status attached to it. So to perform their roles, people choose proper dresses to carry out their task effectively and to express their status.

2. Economic factors

1. **Income:** The increase in income occurs due to high pay scales offered in different jobs and more number of family members earning livelihood per family now-a-days. The increase in income of the family affects the availability of the funds for purchasing the clothing for different family members. Besides basic clothing needs, the specific wants of the family members could also be met with the availability of money in hand. Thus the members could choose different types of garments along with the accessories to improve their appearance.
2. **Changing status of women:** The education and the employment of the female members have changed the financial status and decisive powers in the families. The families have high income level and the women are now taking decisions for the clothing of other family members owing to their empowerment. Besides this, different

clothes are required for work and home. Thus the clothing selection for a specific family member has changed a lot in terms of style, colour, texture and their quantity.

3. Psychological factors

1. **Needs:** The clothing is required to fulfill the physiological (comfort, warmth and disposition) and psychological (comfort, conformity and personality) needs of the wearer. So the clothing with specific colour/s, fabric and style is chosen by an individual to have proper fit, comfort and to express the personal self through it. Since every individual have distinct physical characteristics and psychological needs, they require different types of clothing even in same conditions. Beside this, people with special needs (physical and mentally challenged) require clothing as per their needs and their garments may differ in structure and features. Besides this, the needs of an individuals are also regulated by various social and economic factors.
2. **Values:** Values are the standard behaviours expressed by the individuals and are expected by society from an individual. The values of each individual vary as they are affected by different agents of socialization process and they change from time to time. So the values of the members in a family are different from each other. The values we esteem reflect our individuality and play important role in directing our behaviour and decisions. The clothing choices of an individual are thus affected by his/ her values.
3. **Attitude towards clothing:** Attitudes refer to the way one feels, thinks and behaves; are built through experience and interaction with other people. Attitudes and attitude change are influenced by an individual's personality and lifestyle. The clothing is taken as a mean to express ones attitudes towards group conformity, self expression, aesthetic appeal, comfort, economy, etc. So while selecting clothes the individual's attitude affects the type of clothes and accessories chosen for different activities.

4. Technological factors

The developments in the technology related to apparel and textile production and finishing along with the allied sectors affect the clothing choices due to:

- Availability of new products with better comfort, durability and finish
- Suitability of product to varied end uses
- Communication of designs globally at fast pace
- Care auxiliaries' and equipment's availability resulting in easy care and maintenance

FACTORS INFLUENCING CONSUMER BEHAVIOUR

Various factors influencing consumer behaviour are classified into 4 categories

1. economic factor
2. personal factor
3. cultural and social factors
4. psychological factors

1. Economic factors influencing consumer behaviour

- Personal income- total income of the consumer
- Discretionary income – income available to a consumer after deducting taxes and basic cost of living.
- Disposable income – income available with consumer to spend according to his wishes.
- Family income - income of the family. Lower income families have less demand and prosperous families.
- Consumer Expectations regarding future income
- Availability of liquid assets with the consumer
- Consumer credit – availability of consumer credit, credit policy
- Level of standard of living

A consumer demands more and spend more with increase in the income or expectation of future profit or availability of liquid cash or availability of credit but saves and demands less in its absence. The nature of consumption and buying pattern of a consumer is also affected by the income of the family and the level of standard of living.

2. Personal factors influencing consumer behaviour

- Age- people of different ages have different needs.
- Occupation – professionals, Businessman salaried workers have different demands
- Lifestyle cycle stage – newly born, teenager, bachelor, married, parents grandparents .
- Lifestyle – achievers, strugglers strivers, makers
- Personality – aggressive, shy, introvert and extrovert ,conservative, experimental.
- Self-concept – one's perceptions towards themselves.

3. Cultural factors affecting consumer behaviour

- Culture- culture is basically the way of living and thinking pattern that is followed from generation to generation in a society. It includes knowledge,

believe, traditions, morals, values, customs and other such habits that are acquired by people as members of society.

Example Indian culture is entirely different from cultures of other Asian, Arabic and western countries.

- Subculture- subculture is a segment of culture which helps a marketer to know another person's culture either psychologically, socially or through mass identification. Subculture consists of a group of people within a culture who exhibit similar buying behaviour and have similar believe
example within India, buying behaviour of Muslims of the north India can be differentiated from the Muslims of the South India
- social class – social class segments the market on the basis income criteria and standard of living. It refers to divisions of members of a society on the basis of education, occupation, income etc. Usually people belonging to the same social class have similar preferences in case of choice of Residence, entertainment, luxury products etc,
Example buying behaviour of the upper class can be can be easily differentiated from the middle and lower class

Social factors influencing consumer behaviour

- **social group-** A group is any collection of individuals with similar interest, opinion and activities. And individual draws news regarding consumption and disposal of products from various social group he belongs to. The various social groups and individual forms a part of are;
 - a)Reference group- it refers to all those people which directly affect the Purchase pattern and decision of a consumer as they serve as a point of reference for comparison for the consumer while making a Purchase Decision.
 - b) contractual group- it includes friends, family, peers who have a direct and daily face to face interaction with an individual. They are most important source of influence on consumer behaviour.
 - c) avoidance group – A group of people that have a negative impact on a consumer. A consumer dissociates himself from such a group and avoid using products and services used recommended for promoted by the avoidance group. d) aspirational group – it includes film stars, TV celebrities, sports stars etc. Whom a consumer aspires to be. A consumer wants to associate himself with people he aspires and uses products and services used, recommended and promoted by them.

- **Opinion leaders** - it refers to a key individual in a group which influence the behaviour of member of a group by providing them relevant information about a new Trends and products in the market .

- **Role and status** – every person place many roles in the society that is employee to his boss, parent to his children, referer for young ones, advisor to peers etc. and their behaviour pattern depends upon the role they play in the society. People also select and buy products according to their status in the society. Social status of a person refers to his or her position in the society depending upon his income, occupation ,education etc.

Example CEO of a company would prefer to buy branded products from big store, while working in the same company may prefer value for money products from nearby stores

4. **psychological factors affecting consumer**

Customers behave differently towards the same marketing mix due to their respective psychological makeup. The psychological factors that affect consumer behaviour are;

Motivation – motive is an internal force that drives a person to do something that is fulfil a need, achieve a goal, solve a problem. Different motives of a consumer can be understood through Maslow hierarchy of needs. All consumer react differently towards a product depending upon their position in the hierarchy. That is an individual will first satisfy his basic needs and then move upward in the hierarchy with satisfaction of each want

Involvement - it refers to the amount of interest or importance a consumer shows towards a product. A consumer may have high or low involvement in a product for example a cricketer will give a very high importance and will be highly involved by purchasing a cricket bat while he may have very low involvement and interest when purchasing luggage bag.

Perception - it is a process of selecting organising and interpreting information from our internal and external environment to form a meaningful picture. All consumer perceive the same product differently according to their own perception. For example wrestling is perceive differently by different people some perceive it a meaning less fighting while some consider it a sport.

Learning- it is a process which brings a permanent change in the behaviour of a person. People generally learn through past experience and develop a certain behaviour towards a product or service.

Personality - it refers to the total of all physical mental and moral characteristics of a person. Consumer by products that suit their personality, for example some people prefer wearing formal clothes some like to wear casual clothes depending upon what suit their personality.

- a) Lifestyle- a person's life style is made up of his activities opinions and interest. Lifestyle of a person also depends upon his position in the life cycle stage that is teenager, bachelor, married etc.
- b) Attitude - attitude is a person's predisposition to act favorably or unfavorably towards a product, service, event, people etc. It is the way a person think or feels about an object. Consumers develop positive or negative attitude towards a product or service due to a marketing stimuli, situational variables, experience or advertising and then decide upon an intended action for that product or service for example entrepreneur attitude towards risk, some are risk takers some like to play it safe.

CLOTHING REQUIREMENTS OF INFANTS

New born babies' clothing must provide warmth, comfort and hygiene. Since baby's body allows quick heat up and cool-off, their body temperatures have to be watched very carefully. Hence clothes selected for babies should keep them sufficiently warm at all times. During the early months, the activities of an infant are limited to eating and sleeping, the clothing needs are limited to a few items which are necessary for his protection and comfort like shirts and diapers. Babies outgrow clothing very fast. Everything a baby wears should to be washable. In fact, it is wise to wash everything a baby uses before wearing even if in a sealed package.

KEY POINTS FOR SELECTION OF INFANTS CLOTHING

Clothing requirements for babies from birth to six months are few. The amount and type of clothing which the infant will need will be determined by:

1. Time of year
2. Climatic conditions
3. Warmth of the child's room
4. Condition of the child

However, infants clothing should be selected primarily on the basis of following points:

- 1. Infant's clothes should be selected primarily on the basis of comfort and ease of care.** Comfort is the most important factor to be considered for baby's clothing. It can be achieved by

- The use of right fabric/material
- The design of the dress
- The method of construction

Use of right fabric/material: The fabric chosen for the infants clothing should be absorbent, porous, soft, pliable and not irritating to the skin of the baby. Cotton is by far the most suitable fabric. Blends with more percentage of cotton are also suitable. Fabrics chosen should be lightweight yet warm enough. Fur materials are to be avoided, as there is a danger of the loose fibres getting into the baby's throat.

The design of the dress: Design of the dress is an important aspect that should be considered while selecting clothes for children. Wrappers, Kimonos, and shirts that open all the way down the front or back are considered to be the best choice, since they need not be pulled over the baby's head. The garments should be sufficiently large to make it easy to get the baby's arms into the sleeves but should not be so large that they make uncomfortable folds.

Simplicity should be the key point while selecting clothes for infants. Fancy trimmings are to be avoided as they irritate the baby and require extra care during laundering. Drawstring around the neck or a bonnet string should be avoided, as they can get pulled tight and become dangerous if a baby rolls over and get entangled in them. It is better to have ties and flat fasteners than large decorative buttons that can come off and be swallowed or poked in a nose or ear.

The method of construction: Baby's clothes should be comfortably loose to allow freedom of movement. The seams in a garment might cause discomfort if they are

numerous and bulky or placed where they tend to rub against the tender baby's skin. Clothing should be simple and well made.

- 2. The number as well as type of garments in the layette depends a great deal upon the resources and preference of the parents.** The most important thing is to have enough clothing to keep the baby warm and clean at all times. The mother's ideas as to how the baby should be dressed will also influence the number and type of garments to be purchased. To keep the baby comfortable and clean, a small number of easily cared for garments are sufficient. But if the mother feels the need to dress up the baby, then dress up clothes will have to be added to the layette.

Purchasing the layette

The period from birth to 18 months is termed as infancy. As a general rule it is better to have two to three layers of clothing than a single thick layer. Appropriate clothing along with adequate food and sleep contributes to the growth & development of the baby.

The first set of clothes required for a baby is termed as layette. The items to be included in the layette may vary from region to region and as per customs. Generally, a layette includes

- Gown and wrapper
- Shirts/Jabla
- Diaper & diaper cover
- Sweater/sacque/hood
- Bonnet or cap
- Booties/shoes
- Mittens
- Bib
- Outer wear/Dresses
- Towels and face cloth
- Blankets
- Crib sheets
- Mattress pads
- Lap pads
- Napkins

The first year of the birth is characterized by rapid growth, so the baby will outgrow much of his clothing by the time he is an year old. Hence it is wise to buy one size bigger, for the clothes to last a long time. Changes of season may necessitate a change of items in the original layette.

Infant's layette in detail

- 1. Night gowns or wrappers** - The gown/wrapper/kimono is the basic garment in a layette. They can be used for both day and night wear . They should be made out of soft cotton that is absorbent, comfortable and easy to wash. Suitable fabrics are flannellette, muslin, knits, nainsook etc. (hyperlinks for underlined words)

Gowns are long bags with an envelope fold or drawstring at the bottom. Gowns should be at least 27 inches long. One advantage of gown is that it keeps the baby's feet warm. But it has to be changed if the baby wets it. When gowns are closed at the

bottom they are called sleeping bags. They should be long enough to permit the baby to move his legs.

Wrapper/kimono opens all the way down and can be worn with the opening either in the front or the back depending on the way the baby sleeps. If the baby sleeps on the back it can be fastened on the front and vice versa.

2. **Shirt/jabla** - Cotton shirts or jabla's can be found in styles with or without sleeves, diaper shirt, slip-on, or double breasted with either tie-side or pin-on. **Double breasted shirts** have no fasteners and have to be pulled over the baby's head. So they should have adjustable necklines for ease in dressing. Some shirts have waterproof tabs for pinning the diaper to the shirt. **Sleeveless shirts** are made of soft cloth like lawn, and are ideal for summers. In warm climates a diaper shirt and diaper may be enough for the baby. offer extra warmth across the chest and abdomen and are easier to put on and take off.

All the shirts should have an ample armhole to make the dressing easier. Fasteners at the side of the garment are preferable than on the front/back. For slip on shirts, the neckline should be large enough, so that it does not hurt the baby when the shirt is slipped over the baby's head. Shirts that are to be pinned should have extra thickness where pins are inserted, since constant pinning on a single thickness wears out the material.

3. **Diaper and diaper cover**- Diapers are the first item to be considered in a baby's wardrobe. It is essential that diapers be soft, absorbent, easily washed, and quick drying.

There are five main types of diapers

- **Bird's eye:** Made from fairly heavy fabric & woven with small geometric designs. It is bulky and dries slowly but lasts longer than others
- **Flannel:** Made from flannel cloth, they tend to be bulkier than bird's eye. They take a longer time to dry.
- **Gauze:** They are made from two layers of gauze cotton material. They are light in weight, very absorbent and dry quickly.
- **Knit:** Made from knitted material, these diapers stretch to fit the body and do not require folding. It prevents the bulk between the legs a problem seen with other diapers.
- **Disposable:** Made from paper like disposable material and is available in pin-on, pad and diaper liner types. Diaper liners are made from soft cloth like cheesecloth.

Diaper covers are made from plastic or other water proof material. They should be loose and cut in such a way that it allows air circulation. They should not be tight as it might lead to rashes on the baby's body. They should not be worn more than necessary.

Waterproof pants come in three styles: all rubber that fits close to the body, bloomer with elastic around the legs and waist, tailored or gripper type made with plastic lining and grip fasteners at the sides. Diaper covers prevent the bed clothing from becoming wet.

4. **Sweater/sacque/hood-** Sweaters are a necessity, they keep the baby warm. A hood or a cap will provide extra warmth to the baby. Sweaters can be made out of cotton, acrylic or wool. They should be large so that they can be put on over the gown/shirts.

A sacque fits the baby closely like a bed jacket and opens down the front. The sleeves should be loose and large. Gripper fasteners are used with a soft knitted neck band. They may be knitted, crocheted or made out of any light weight fabric. Hoods and cap fasten under the chin and should be snug. They can be knitted, crocheted or made from soft cotton.

5. **Bonnet or cap-** This is only for outdoors when there is a cool wind blowing. A cap, fastening under the chin, is a good type to use for the baby. It keeps the baby warm.
6. **Booties / shoes-** A tiny baby's feet easily get cold except in hot weather, and he needs to wear woolen booties which fit snugly round the ankles fastened with a crochet draw string.
7. **Mittens -** Mittens cover the tiny hands of the baby and help keep them warm. They are different from gloves in the sense that mittens do not have separate finger openings.
8. **Bib-** They are necessary to protect a baby's clothing from soil & moisture and drooling. Absorbent cotton fabrics such as terry cloth with a plastic underliner are a wise choice. Dress up bibs can be made of organdy with an underlined absorbent material.
9. **Outer wear / dresses:** The new born baby requires some outer wear or dresses also. Dress should be made of soft cotton and be sufficiently large to make for easy dressing and allow for growth. Shoulder buttons help in easier dressing. Trimmings on the dresses should be simple like pin tucks, hemstitching, feather stitches, French knots and narrow simple embroidery that add to the appearance of the dress. Raglan and magyar sleeves are better than set-in-sleeves as they fit more loosely and allow for a little room when the baby grows.
10. **Towel/ face cloth:** Towels and wash cloths should be soft and sterilized before use. They can be made from soft absorbent material like terry cloth. It is not necessary to purchase special towels for the baby. A family towel can be set aside for this use.
11. **Blankets:** Blankets can be

1. Receiving
2. Crib
3. Outdoor type

They can vary in size and weight. **Receiving blankets** **Crib blanket** can be a quilt, made from soft and absorbent material. Crib blankets should be light weight and large enough to tuck in at the bottom of the crib. There should be at least 1 to 2 crib blankets in a layette. **Outdoor blankets** are heavier and needed to wrap baby to help protect the baby from cold. Usually a hood or head covering is attached to these

blankets. can be of flannel or napped material, light in weight and are generally small in size. They are used to wrap newborns snugly to lessen the shock of the new, open environment. About 2 or 3 receiving blankets or outgoing flannel squares about a yard square are adequate.

Cotton and acrylic are preferable for baby's blanket. Cotton blankets are easily washed, soft and inexpensive, but required more drying time. Acrylic blankets are light weight, dry very rapidly and are less apt to stains, but are more expensive than cotton.

12. **Crib sheet:** Crib sheets are useful for tucking the mattress. They should be of adequate size to tuck in. If slip sheets are made for the crib, the baby's bed can be kept clean easily with three sheets. The slip sheet is placed on the crib tied to the four corners of the crib. If the baby spits up and wets the slip sheet, it can be easily removed without remaking the bed. Since the slip sheet is not much larger, it is easier to wash than a full sheet.
13. **Mattress pads:** They are made of either plastic, rubber or quilted cotton. And should be large enough to cover the mattress. If a slip sheet is used, the mattress should be placed between the slip and lower sheet.
14. **Lap pads:** They are 15" x 15" in size and can be cut from any plastic or rubberized material.
15. **Napkins:** Napkins are a necessity, while handling a baby. They are made from absorbent material and are useful to wipe the baby's mouth after feeding.

CLOTHING REQUIREMENTS FOR TODDLERS

A child who is 12 to 18 months old is known as a **toddler**. Toddlers need additional clothes as their physical activities change during this phase. Their crawling activity is the most significant one during this phase. Also physical growth is rapid. So clothing selected should be large enough to allow for growth. Cotton is best because it is a good conductor of heat, absorptive, easy to wash, cheap, durable and soft etc. Firmly woven and durable materials like poplin, cambric etc are ideal for toddlers.

Desirable features in toddler's clothes

1. Comfortable to the child – loose enough
2. Easy to put on / put off
3. Good absorbency
4. Warm during winter / rainy season
5. Soft
6. Cheap and durable
7. Easy in care & maintenance
8. Light weight fabrics

Since the toddler is engaged in crawling and climbing, clothes should protect the body from the dirt on the floor and should be loose at crotch and hip area to allow room for diaper/training pants. The garment should be snug at the shoulder and stay on. Suitable garments would be rompers, overalls and knitted shirts.

A toddler's clothing / wardrobe should include

1. Overalls, creepers and sun suits
2. Training pants
3. Shirts and blouses
4. Dresses and slips, Suits
5. Night wear
6. Shoes and socks

1. Overalls, creepers and sun suits

A one piece garment with a fastener opening at the legs or crotch is known as a **Creeper**. A creeping baby moves on his hands and feet and so requires clothing that allows him freedom to do so. Ideal clothes for boys or girls in summer would be creepers or sun suits. In winter both boys and girls can wear overalls. Overalls give protection to the knees and legs of the creeping child.

Points to remember while buying overall, creeper and sun suits:

1. Overalls, creepers and sun suits should have fasteners (zips or buttons) in the crotch to permit enable changing of diapers without completely undressing the child.

2. The back crotch should be several inches longer than the front to accommodate the diaper and allow easy movement.
3. Creepers, sun suits and overalls are available with a water proof plastic lining in the pants, which help them to stay dry even though the diaper is wet.

2. Training pants

Training pants helps in toilet training of a toddler. They should be large enough to fit the child from the diaper stage until he is of pre-school age. There are two main types of training pants for toddlers, cloth and disposable. A two-way stretch girdle is a popular type of training pant. It fits snugly around the hips, is short in the crotch and is sufficiently heavy and absorbent to catch most accidents.

3. Shirts and blouses

These are worn with the overalls and sun suits. These should be made from a soft fabric, preferably cotton knit. Well known 'T-shirt' is the most suitable one.

- Blouses should have extra fullness at the shoulder to make for ease of movement.
- Shirts that open down the front or back are easier for dressing than those that pull over the head.
- Gowns and wrappers cut off at the bottom can be used for shirts and blouses for everyday wear.

4. Dresses and slips, Suits

Dresses and suits should be purchased with room for growth, but not so large as to be cumbersome for the child. They should allow for freedom of activities and be easy to put on and take off as well as to launder. If a dress is light in weight and a thin slip may be needed also. Avoid elaborate trimmings that tend to irritate the child's skin and cause problems in laundering

Outer suits should be of wool / acrylic and should be interlined. These suits should be large enough to accommodate overalls or dresses and also should have allowance for growth. In cold weather, baby needs warm suits / coats and legging sets or leg warmers.

5. Night wear

One piece pyjamas are better than two pieces for a creeping baby / child. Pyjamas should be soft and easily washable.

6. Shoes and socks

1. Shoes are used to protect the creeping or crawling baby's feet from being scratched.
2. Shoes and socks provide warmth
3. Shoes should be soft and have flexible soles
4. Shoes should be heelless and slip proof and fit snugly around the heel in order to grip the foot firmly.

CLOTHING REQUIREMENTS FOR THE PRESCHOOL CHILD

Children between 3 to 6 years of age are termed as '**pre-schoolers**'. At this age the child is engaged mostly in play and hence clothes should be suitable for their physical activities. At the same time comfort and health features should not be overlooked, while selecting clothes for the child.

Preschoolers have a distinct liking and disliking for different clothing and they like to wear clothes that are similar to their playmates, which give them a sense of belonging to the group. A little boy will not enjoy wearing a new jacket when his playmates are all wearing sweaters. A child may suffer from being overdressed or feel inferior because he is not as well dressed as his friends. Dressing up like their playmates is necessary for their social development but at the same time clothes should be suitable for their physical activities which are equally important for child's physical development. While at play, pre-school children like to run, jump, climb, carry, push and pull with ease. Thus, one should select light weight; well-fitted, comfortable garments with less constructional details which will not create hindrance in playing.

Consequently, proper clothing not only enhances growth and development of the child but also gives the child pleasure and self confidence, thus making childhood a delightful period.

Factors To Be Considered While Selecting Preschool Children's Clothing

- 1. Fabrics**
- 2. Comfort**
- 3. Safety**
- 4. Self help**
- 5. Room for growth**
- 6. Easy of care**
- 7. Decoration**

1. Fabrics

The right fabrics for preschoolers would be those that are

- Absorbent so that they do not irritate the child's sensitive skin
- Comfortable to wear and soft to touch
- Wrinkle resistant and therefore easy to maintain
- Do not soil readily

It is better to avoid clothes that require dry cleaning. Cotton is the best choice for children's clothing as it is easily washable and comfortable to wear. A blend of cotton and polyester is often more comfortable for child than all polyester as it is more absorbent. Wool is warm but requires some special care and may irritate delicate skins. Acrylic sweaters may show pilling but are warm and machine washable & require no special care. Trims are undoubtedly attractive on children's clothing but should be selected with thought. If a trim is not colour fast it ruins a garment. Some braids may shrink more than the fabric itself causing puckering.

Materials suitable for boy's suits and shorts are lawn cloth, poplin, gingham, gabardine, Khadi, soft denim and Jean etc. Girl's dresses need more fullness and hence use soft materials such as lawn, poplin, gingham, voile, mulmul, cambric etc.

2. Comfort

The most important clothing consideration for children is comfort. Clothes should not hamper the child's play rather facilitate play. Tight clothes which restrict activities and interfere with natural circulation should be avoided as it may actually cause an unpleasant rash to develop in sensitive areas.

1. Soft and absorbent fabrics contribute to comfort.
2. Clothing selected should be of correct size according to the age of the child. It should fit the body & the limbs snugly rather than one that is one size big.
3. Pants & panties should have enough room around the crotch. They should not restrict the child's movements.
4. Rough textures are to be avoided as they tend to irritate the child's smooth skin
5. Garments selected should not have undue strain across the waistline.
6. Elastic bindings should be loose otherwise it may cause irritation on skin.
7. Heavy, bulky clothes are tiring and hard to handle, hence select light weight clothes.
8. Clothing should be changed as per season. The child should be kept warm in winter. Dress the child in minimum clothes during summer.

3. Safety

Comfort and safety go hand in hand for children's clothing. Clothes which are too large may be uncomfortable and may also cause awkwardness in the child. Loose garments can get caught on objects or parts of playing equipments and may catch on fire more easily so should be avoided. Buttons and loose trims are unsafe for babies and little children who put everything in their mouths.

- Accidents or death in fire can be prevented by using fabrics made from fibres that do not burn readily or using fabrics that have been treated with flame retardant finishes. Synthetics burn fast, melt and stick to the body and hence should be avoided.
- Reinforcement should be given at garment areas that are subjected to a lot of strain. Ex: at knee area.
- Drawstrings should be avoided at neck.
- Long ribbons /belts that get caught while at play are to be avoided.
- Ties at either cuffs or pant hems that might cause the child to trip and fall should be avoided in garments

4. Self help

The features that help the child to put on and take off the garments easily on their own are called 'self-help' features. These features develop independence in the child and foster a feeling of confidence and self-reliance. Following are some of the self help features that can be incorporated into the preschool child's clothing:

1. Large openings in garments aid in easier dressing.
2. Front openings are easier to handle than back or side openings.
3. A child can easily grasp large buttons and dress himself without the aid of an adult.
4. A garment front must look different from the back so that a child can easily recognize it.
5. Simple styles are easier to handle than complicated ones.
6. Large armholes and neck, loose sleeves make garments easier to get into.
7. One piece garments are easy to put on than two piece ones.
8. Mittens are simpler to put on than gloves.
9. Collarless dresses are simpler to handle than those with elaborate design details.
10. Separate belts are best avoided as they may get twisted and get caught while dressing.

5. Room for growth

Growth is most rapid during the pre-school years. Clothes with adjustable features have possibilities for longer wear. However, the following features should be looked for when selecting clothing for the pre-school child:

1. **To provide for growth in height:** The following features provide for growth in height
 - Skirts, dresses & trousers with deep hems or tucks at the bottom can be later opened up as the child grows in height.
 - Overalls with adjustable straps help in adjusting the length of the garment
 - Yoke dresses with lengthwise tucks can be released later as the child grows in height
 - Two piece garments are better since they can be mixed and matched with other garments
 - Garments with no waistline and deep hems can be lengthened as per the child's needs.
2. **To provide for growth in girth or width:** The following features provide for growth in width
 - Yoke dresses with crosswise tucks can be released later as the child grows in girth
 - Garments that provide growth in girth or width such as Raglan or kimono sleeves are better than set-in sleeves.
 - Garments made out of stretch fabrics help tide over any sudden growth spurts.
 - Tucks, pleats and gathers at shoulder can be released as and when the garment gets tight.
 - Large underarm and leg seams can be let out as needed.

6. Easy of care

Clothes that wash easily, stand the strain of wear and frequent laundering, need little or no ironing, and do not need continual mending are ideal for children. Good quality seams, buttons, buttonholes and trims should be used while making children's clothes.

Reinforcements should be given at garment parts subjected to strains such as knees, pockets corners and elbow. French or flat fell seam wear longer than plain seams. Fasteners should be as flat as possible. Hems should be firm and devoid of strings that may get caught.

7. Decoration

Children love animals and their pictures. Appliqué work in animal designs looks elegant on children's clothes. Bias binding, drawn thread work, smocking cross stitch, French knots, faggoting, blanket stitch are some of the recommended decorations to be used on the children clothes. Pockets add to the child's pleasure and satisfaction more than any other feature.

Pockets may be used on boy's shirts, shorts and play suits. Pockets for a hankie and a little girl's "valuables" encourage neatness and help to provide a sense of self-importance. Patch pockets are easy to reach and less likely to tear if placed on the slant. They must be placed on the dress in relation to the design of the dress so that they do not become the centre of interest or spoil the proportions of the dress. Large collars add weight and bulk and are therefore not comfortable for a child.

Wardrobe of pre-schooler

A preschooler may have exact preferences for colour type and style of garment to wear. Shorts, slacks, frocks, overalls, trousers and jeans are favourite play clothes of pre-schooler.

Little girls' dresses can be very attractive in a simple style with becoming lines and colours and simple trims. Dress length should never be too long otherwise it might come under the feet while playing. Some girls like dress shoes and garments to be very feminine, preferring frilly petticoats and full skirts that make an "effect" when twirling. As little girls grow up, they enjoy having some accessories "just like mothers" like purses etc.

Pre-school boys are rarely as fashion conscious as little girls but they want to be dressed like other boys as well as be comfortable. Most children copy the dress habits of their peers and feel uncomfortable when dressed differently. Clothing with self-help features and sturdy garment construction is essential for little boys. If all trousers or overalls are of the same style, self-help is easier and the small one feels more secure. Diversity in clothing can be obtained by having variations in colour and fabric.

Requirements of children's clothing

The ideal baby clothing should be:

- Soft, comfortable, easy to put on and take off and comparatively loose.
- Easy access to his/her nappy because it requires frequent changing.
- Non-flammable.
- Lightweight.
- Non-irritating.
- Underclothes should be essentially made of organic fibres.

- Allow quick transmission of sweat from skin to environment.

Garment classifications

Children garments are generally classified into many categories. They are as follows:

Casuals

Garments designed for informal occasions are termed as casuals: They are T-shirts, knitted garments, etc. Knitted fabrics give more freedom of movement than woven fabrics and are ideal for casual wear. During the movement these knitted loops helps in pumping air through close-fitting garments, thus removing body heat during summer. It gives pleasing appearance, loose elastic structure, comfort and softness.

Daywear

The fabric's selected to wore as daytime wear are cotton, gingham, gabardine and sail doth during summer season. Double knits velveteen and corduroys are selected during winter season. Children's day garment has to be made up with a fabric that will stand for repeated laundering, the seams should be strong and fastenings should be secure.

Nightwear

While selecting the garment it should not possess any harmful ingredient and accessories, as the skin of children is very tender and smooth. The garment selected should have good drape and it should serve the purpose.

Partywear

Industries focus on manufacturing luxurious garments for children in various styles and prevailing trends. These are also called as special occasion garment. Fabrics like velvet, denim, satin, etc, are used in party wears with different styles.

Uniforms

The uniform worn by children should be subjected to certain treatments like antibacterial finish, etc, and it should be free from odour.

Sportswear

It should have freedom of movements. Knitted garments have higher extensibility in both length and widthwise directions. Hence, knitted materials are mostly selected as sports wear for children. Active sports wear can be classified as summer sports wear and winter sports wear.

High fashionwear

Fashion in clothing has always been a reflector of change in life style of people. A complete range with the most luxurious look and superior comfort is an absolute must. Greater spectrums of bright, vivid colours and designs have become the key for the purchase of high fashioned wear. They look only for latest fashions and these can be worn during special occasion like parties.

Selection based on seasons

Children's garments are selected with respect to season in order to protect their body. During selection, the garment is selected according to two seasons, summer and winter season.

Summer season

Lightweight garments should be preferred on summer season because the lightweight fabric can be able to breathe the body moisture in to the environment easily. Children feel more comfortable on wearing cotton fabric. The garment selected should be loose to wear. Colour also plays vital role. Colour differs according to different climatic condition. During hot season light colours like white, blue, green, purple, etc, should be given importance. Black colour should be totally avoided during summer season.

Winter season

To give a warm condition, the garment should be in thick nature. Hence materials like wool, acrylic are mostly preferred. The colours preferred for this season are red, red-orange, maroon etc, during this season children easily get affected by cool air. So, knitted garments like sweater come into their existence. Sweaters can be designed as smooth and bulkier, shagged, hairy, etc, which prevents the loss of heat from the body. Sweaters are also named as pullover. Cashmere type of sweater is used for great softness and lightness.

Selection based on liking

Children focus their eyes on the new creations, new styles and new models while selecting their garment.

Children wider their selection based on:

- Fashion
- Colour
- Accessory works
- Painting and printing

Fashion

Fashion reflects the changing life style of garment. Fashion changes accordingly to the new development techniques. Now-a-days fashions are created according to the mindset of children. The garments are designed and styled based on these fashions.

Colour

Children like bright colours: Red, blue and yellow. Brown, warm/cool colours combination, the royal purple is some of the colours that are raising its peak in this youthful world. The colour reflects the mood of the children. The colours used in children's garments should not be sensitive to their skin.

Accessory works

The value added works in children garment mostly consist of:

- Embroidery
- Patch work
- Attachment
- Printing and Painting

Trim can make a garment special to child. Decorative machine stitching, embroidery, smocking, ribbons, braid, rickrack, appliqués, ruffles. Lace and bias binding are some trimming possibilities. Be sure the care requirements are compatible with the fabric while selecting the trim.

Children also like designs. Such as printed designs, stripes, and plaids should be small and in scale with the child's size.

Finishes for children wear

A finish is a process given to a fabric to improve its qualities such as appearance, hand, drape and certain other properties.

Antistatic finish

Synthetic fabrics are hydrophobic in nature and tend to accumulate static electricity. This static electricity causes problem such as clinging of the garment, attraction of dirt and sparking. These fabrics are given a chemical treatment, which enables the fabric to attract and retain water molecules. This helps to dissipate electric charge from the fabric surface and making the fabric more comfortable to children.

Antibacterial static finish

This is a chemical treatment, which makes the fabric resistant to bacterial growth. It renders the microbes inactive, which come in contact with it. Some of these finishes also make the fabric mildew resistant and even prevent damage of the fabric by perspiration.

Antimicrobial finish

Antimicrobial finishes are applied to the garments like sportswear, leisure wear, T-shirts, socks, wipes etc. Antimicrobial are used to control the growth of algae, bacteria and yeast. This prevents the fabric from rotting, staining, unpleasant odours and other health concerns like physical irritation, allergic sensitisation etc.

Crease-retentive finish

It is also called as permanent press finish, or durable press finish. A resin treatment is given to a fabric, which is then stitched into a garment, eg, a pleated skirt for girls. Heat treatment is applied to the garment to have a permanent pleat. It does not require ironing but may require light pressing.

Mildew resistant finish

Cotton/linen and cotton/wool blended fabrics are mostly liable to mildew in humid climates or if left moist in the dark. Cotton and rayon's containing starch are particularly vulnerable to attack by mildew. If a mildew resistant finish is given, these fabrics resist the growth of mildew or mould. This is mainly given to children's bed spread, towels etc.

Moth-resistant finish

Wool is susceptible to attack by moth. If the wool is treated with certain chemicals like fluorine compounds, chlorinated sulphonamides, quaternary phosphonium compounds it is not damaged by moth and carpet beetle. This is given to woollen sweaters and woollen garments of children.

Soil release finish

This finish is mainly applied to sports-wear of the children, which helps the garment from getting stained. The finishes that give soil release are:

- Polymer containing carboxylic groups.
- Compounds containing oxyethylene or hydroxyl groups.
- Fluorocarbons containing hydrophilic groups chemically reactive compounds.

This helps the garment from getting stained.

Anti-shrink/anti-stretch treatment

Anti-shrinking is a process in which the dimensional instability is avoided. This makes the fabric dimensionally stable. The material used for children's wear should be treated with anti-shrink or anti-stretch treatment.

CLOTHING REQUIREMENTS FOR THE ADOLESCENTS

Adolescence is a stage that links childhood and adulthood i.e., it is the last stage of the childhood when an individual starts imbibing adults' characteristics physically, psychologically and socially. An individual undergoes physical, physiological, psychological and social change at rapid pace. Chronologically adolescence is regarded as the period between 11 to 18 years of age. Adolescence extends from the time the child becomes sexually mature to the time when he attains legal maturity. It is divided into two parts as follows:

- Early adolescence (11 to 15 years)
- Late adolescence (16 to 18 years)

The awareness of this period of development of an individual with relation to his clothing needs become very important because of number of aspects like rapid changes in body size and shape, increased interest in clothes and grooming, enlarged social circle and being a stage of intense emotions.

Characteristics of adolescents

1. **Physical development**
2. **Emotional development and mental state**
3. **Social role and status**
4. **Adolescents and their parents**

1. Physical development

- a. girls develop physically sooner than boys; changes take place in body proportions, size and appearance; the long bones of the legs and arms grow very rapidly, face takes as its adult shape and reach their maximum adult height and gains weight because of growth of fat tissues,
- b. the onset of puberty is most obvious; primary and secondary sex characteristics develop fully
- c. a girl have broader hips, smaller waistline and wider shoulder and further growth in height stops suddenly on achieving sexual maturity while among boys shoulders broaden and hair appears as the face, sexual maturity of boys does stop their growth, there is continuous increase in weight and strength
- d. Skin changes result in acne, the most universal physical plague of the early adolescents
- e. Late adolescents take the appearance of an adult physically

These physical changes are accompanied by physiological status including basal metabolism, blood pressure, respiratory volume and changes in muscular strength, etc.

These bodily changes affect the adolescents a lot; their clothes out grow very quickly and hence need to be selected very carefully. Their clothes should be designed or selected to allow for the change in size besides being as per their taste. Particular care is required in case

of girls who have marked growth in bust that sometimes makes her embarrassed about her development. Hence their clothes must minimize bust rather than to emphasize. This can be done by use of appropriate undergarments and proper selection of clothes like by using Jersey bra and two piece dresses rather than one pieces dress.

Some times growth features grow reverse in case of boys and girls; development of feminine characteristics in boys like slender shoulders, wide hips and wide shoulder, thin hips and a flat chest in girls. Such cases require special attention while choosing garment like choosing clothing with extra padding or stiffeners at different portion to achieve normal contours.

2. Emotional development and mental state

1. the period of transition from childhood to adult independence
2. personality develops; put emphasis on self-appraisal; increased emphasis on personal dignity and self-esteem
3. establish a unique personality; inherent behaviour, special interests, likes and dislikes
4. individuation process initiates; increase the psychological distance between themselves and their parents
5. separation anxiety and sense of loneliness develops
6. want to spend time alone; day dream about their future life
7. intellectual interests expand and gain importance in life
8. short sightedness; interested in present, limited thoughts of future
9. emotional chaos creates negativities at both body and psyche level like change in dietary pattern, depression or anxiety; negative emotions are tremendously powerful
10. conflicts at adolescence in teenagers and adolescents are more mental than physical
11. period of considerable stress; tendency to return to childish behaviour, particularly when stressed among early adolescents that tends to reduce with age
12. display shyness, blushing and modesty; increased interest in the opposite sex so are concerned about physical and sexual attractiveness to others
13. interests and clothing style influenced by peer group

This ambiguous stage in life when the adolescents are neither considered child nor adult makes him confused and uncertain about himself. They become temperamental and swing from one intensity of mood to another every now and then. So at this stage their clothing problems need to be tackled very carefully to avoid any complexity of emotional problems.

3. Social role and status

1. become autonomous; moves out of the home circle; more importance is placed on one's role in life
2. work habits become more defined and are more concerned for the future; role confusion and inability to choose vocation creeps in
3. select and follow adult role models; gradually develops a set of ideals resulting in the formation of personal and social identity
4. morals, values, and self-direction are followed; social and cultural traditions gain importance i.e., social life has a special importance
5. peer relationships remain important and take an appropriate place among other interests; provides emotional support and contribute to his or her physical and emotional well-being but face difficulty in forming proper friendship

Thus socially the individual is continuing to grow away from the family, the peer group becomes even more important than their initial years, they become more personal in their

relationship with others and above all they become extremely sensitive to the opinion and approval of others. They are very cautious of their appearance which they usually improve on by their clothes and accessories. Adolescents want to dress up like others so that they are well and are not being laughed at. One of the primary requirements of clothing for the young adolescents is that their clothing needs the approval of the peer group.

4. Adolescents and their parents

The physical, emotional and social turmoil in the life of an individual at this stage results in a distinctive parent-child relationship. The specific characteristics affect the individual's decisions pertaining to different aspects of life among which their clothing holds an important place. The special characters of their relationships have been observed universally and are as follows:

- establish a little distance between themselves and their parents
- complains about increased interference of parents with independence
- emotional conflicts mainly with mother or grandparents; but overall conflicts with parents begin to decrease
- have ambiguous feelings toward parents
- less obvious affection shown to parents, with occasional rudeness

Clothing of adolescents

At this age individuals are involved in various activities like schooling/ college, sports activities, extracurricular activities, get together, etc. Hence they need varied clothing including casual wears, party wear, night wears, school uniforms, NCC dress, sports wear, formal wear, etc. The clothing is an important tool that affects the individual's social development at this stage. The clothing of the adolescents affects the following aspects of the social development:

- Appearance; important for social adequacy and group conformity that increases participation
- Acceptability; means of popularity in a group that builds up confidence level resulting in better decision taking capability

The important components of the adolescents' clothing are as follows:

- Style i.e., according to fashion and fads; wide range of fabrics, colour and styles are preferred by the adolescents
- Becomingness i.e., proper fit, size and colour
- Self grooming i.e., use of jewellery, accessories, beauty care elements as creams, nail polish, lipstick, etc.

Other features related to the clothing of adolescents are:

- Easy care practices for clothes to enable them to learn wardrobe management
- Price and durability of their clothes are considered least by the adolescents; they want/ purchase the clothes that fulfil their physical, psychological and social needs no matter they are cheap or costly and will be useless shortly.

Thus concluding the clothing of adolescents, we can say that there is a difference between the needs and choices of early and late adolescents.

Early adolescents prefer design (fashion) over quality; like to purchase more garments of low cost; purchase with parents; often choose odd sized or ill proportioned clothes owing their perception of self to be young but have conflicts during with their parents regarding clothing and grooming, appearance, hair styling and use of cosmetics; these conflicts over dress are more frequent among girls than boys; boys and girls dress similarly irrespective of family occupation, place of residence or family connections; buy garments each year rather than rotating the old ones as the close-fitting garments purchased become too small the next year because of the rapid growth and the influence of fads; do not plan their clothing purchases over a long period of time, purchase clothing when they have the money, for special occasions or when something new catches their eye; both boys and girls go for readymade garments and girls have more clothing than boys.

Late adolescents prefer quality over design however they have an appreciation for design in clothing; purchase less garments of affordable cost; purchase with friends or by self; go for proper sizes, branded products keeping in mind their values, individuality and the purpose i.e., follow functional, purposeful and styling fashion; settle into patterns which they will use in adulthood.

CLOTHING REQUIREMENTS FOR THE ADULTS

Adulthood is defined in terms of specific physiology, psychological characteristics, law, personal character or social status. Biologically an adult is a person who has attained puberty i.e., appearance of secondary sex characteristics. But with the creation of the social construct of adolescence, an adult is defined as biologically mature person who is recognized by culture and law. Legally an adult is person who attains the age at which he/she can vote, marry, have a job, have driving license, etc. Otherwise it means the person is not considered any longer dependent on the parents and is independent, self-sufficient and responsible.

The adults can be categorized into two groups on the basis of their age, their responsibilities and state of body physiological characteristics as follows:

1. Early adulthood (21-40 years)
2. Late adulthood (41-60 years)

Characteristics of adults

1. **Physical structure**
2. **Emotional and mental state**
3. **Social role and status**

1. physical structure

Early adulthood

The physical appearance is similar to that of last years of adolescence; contours remain similar but attain their maximum height and variation can be seen among individuals of same age group. The female figure has fully developed bust, narrow waistline and broad hips while the male figure is wider at shoulder and narrow at hipline. The young adult female and male have following body and face type:

Male

1. **Body type:** It is an inverted triangle, with shoulder wider than hips. But one can see many variations in men figure; few falls in category of ideal figure.
2. **Face type:** Wide variation is observed in facial shapes like medium oval, round, long slender, broad full and square. But cheek bones are prominent, and face is slender.

Female

1. **Body type:** There is quite a lot variation in body types of women's on the basis of measurements of height, butts and hip; tall, regular, short, slender, average and full.
2. **Face Type:** Wide variation is also observed in facial shapes like medium oval, round, long slender, broad full and square.

The other features among young adults are as follows:

1. Normal skin; acne problem still persists among females
2. Body weight remains constant till the beginning

Late adulthood

The physical appearance starts changing at this age. The body tends to have high fat deposition rate owing to the heavy work load at job or in household and the level of physical activity is low. The physical exercises could not be continued for shortage in time and weight gain occurs commonly. The male and female body figure changes. The changes are more prominent in females due to the affects of child bearing on the hormonal balance and their life styles.

1. body weight increases, vary from person to person
2. body proportion changes; the facial parts thin out while abdomen and hips expand resulting in the widening of pelvic area, thickening of waistline and protruding abdomen
3. menopause in females cause gain in weight, particularly at waist and abdomen

Other general changes observed among males and female are as follows:

1. osteoporosis and involution of the skeleton and degeneration of cartilage tissue begins, increasing the possibility of bend in the posture
2. skin starts to changes; it becomes somewhat dry and wrinkled, wrinkles begin to appear, particularly, on the face
3. appearance of brown spots due atrophy of skin cells increases
4. the hair of the head tends to become gray and thin
5. susceptibility to bone diseases such as osteoarthritis increases which in turn reduces their physical mobility
6. age related diseases such as hypertension and diabetes appear to cause functional losses

2. Emotional and mental state

The adulthood is the most productive stage in the life cycle of an individual. An individual has most stable emotional and mental state at this juncture in life. Still some psychological characteristics related to age are passed on from generation to generation through our genes while others are as a result of physiological changes in our bodies with aging i.e., menopause, etc. Besides, the change in social roles and status also affects emotional state of the elderly people. Adults, men and women, have difference in their emotional and mental state owing to the biological, social, and psychological differences between the sexes.

1. Early adulthood

- learn to form intimate relationships, both in friendship and love
- develop trust or a sense of identity

- The marriage at the age calls for change in the relations, particularly the females who go to husband's place where she has to establish relations with other family member; leaving of parents' place and movement to new place sometimes cause emotional turmoil among them
- The young adults are emotionally attached to their new relation with spouse and new born or young children; any discord between spouse may affect them emotionally
- The child birth also affects emotional state of the women sometimes.

2. Late adulthood

- In this stage an individual is most burdened with the responsibilities of their
- Children as well as the parents; they live with the emotions of the children and parents, hence, are more strained emotionally.
- Menopause and andropause; the imbalance in sexual hormone level at this stage affects emotional state of the women and men, respectively; results in mood swings
- a situation of conflict arises between generation
- Children start moving out for job, etc. leaving the old adults lonely at home; the males and females get affected emotionally; a feeling of stagnation arises
- Also change in the social roles also cause emotional turmoil at this stage.

3. Social role and status

During adulthood an individual passes through different stages of life where he has to conduct different roles within family as well as outside the family at work place and in society acquires the social status accordingly. The different roles acquired by people during adulthood are as follows:

- Son/daughter
- Spouse
- Parent
- Position as per type and level of job / occupation
- Post held in social organization/ professional bodies
- Grand parent

CLOTHING OF ADULTS

The clothing of the adults are thus affected by the roles they play, the status they acquire, their physical and psychological characteristics, their culture and the events specific to individuals during this period like, marriage, birth ceremony of children, etc.

1. Early adulthood

- wardrobe has casual, formal, occupational and clothes for different activities
- follow fashion trends for texture, line and colour
- for marriage expensive, particularly traditional clothes, are purchased

- less demand of clothes since family is at beginning stage and children are young
- since parents serve as model for their children, good appearance and proper dresses are preferred to affect children's emotional and social development and to help them in establishing good clothing
- many a times to meet the demands of their children, often neglect their own wardrobe needs

2. **Late adulthood**

- wardrobe has casual, formal, occupational and clothes for different activities
- follow fashion trends for texture, line and colour but to a limited extent
- more demand of clothes since children are growing and have conflict with parents over choices for clothes; pay less attention to their own clothes
- many a times to meet the demands of their children, often neglect their own wardrobe needs
- household chores leave women with very less time for self grooming and clothes and the working women have little time for self but still are financially capable enough for purchase of clothes frequently for work place
- their clothing choices get well established by this time; prefer comfortable, descent and durable articles for their wardrobe
- men at this stage have established choices for specific fabric, line and colour and have limited garments
- prefer well fitted and comfortable garments
- choose clothes with quality fabrics that will flatter and move with their body
- the people suffering from age related diseases prefer soft fabric, simple style, large openings and appropriate fasteners in their garments to be more comfortable

The male and female adults have quite distinct needs owing to difference in the activities and the roles they perform in the society at different stages in life. Hence the clothing of men and women are discussed separately as follows:

Clothing for women

A woman passes through different phases during adulthood like student, bride, mother and working women. During these phases she has to undertake different activities. All the activities require specific clothes for maximum performance. The clothes required for different activities are as follows:

1. **Clothes at college:** The clothes one requires depends upon college type and activities one have to indulge into. The college student requires clothes for routine classrooms, field visits, extracurricular activities, peer group and her social circle. Besides this the fashion trends, the seniors' experiences regarding choice of clothes and special occasion in the college also affects her clothing e.g. welcome or farewell party may require some special dress.

The college outfits should be of proper fit and drape that exhibits the accent of femininity for the females. They should be durable, colour fast, easy to clean, and easy to care for. The clothes should also be planned according to different seasons.

Foot wears suitable for different activities should be maintained and they should also be comfortable, durable and easy to clean.

2. **Clothes at work:** The clothes should be according to the type of job and the activities one have to carry out. Uniforms are mandatory in some jobs like in hospital as nurse, doctors; service sector as sales girl, house keeping, and in industries as supervisor, worker, manager, etc. Certain profession may have a dress code or colour like sarees for a college teacher, suit for executive jobs and white dress with black coat for the lawyers. The aim of dress at work is to establish identity, provide protection and enhance task performance. Hence the dress should be appropriate in size and use of accessories like jewellery should be kept to a minimum.
3. **Clothes at social events and religious place:** The dress for the various social gatherings should be as per the type of event (family gathering/ community gathering), type of invitees (family/ friends/ both) and the general atmosphere in the society (conservatism/ religious affiliation). The proper outfit at different occasions gives self-confidence and save embarrassment to the wearer. The dresses should be contemporary and local traditional style for social group gathering like marriage parties, birthday parties, lunch and dinner along with suitable jewellery and accessories. While one can use simple dress with a little suitable jewellery and accessories for informal gatherings like family dinner, payjama parties, get together at work place, etc. The visit to a place of worship with bare head and arms is not considered descent. These kind of places should be visited in dress which is sober in colour and style, preferably one should use customary dresses at such places.
4. **Clothes at Sports:** Sports activities usually involve the rapid and continual movement of the individual as well as her body parts. Hence the clothes worn at time of playing and exercising should provide ample space for movements and should be sweat absorbent. Further the clothing needs the players of different games or sports need specific designs to aid them in their game.
5. **Clothes at home:** The casual dress is most suitable for women at home. The housewives usually carry out most of the household chores by themselves. They usually prefer wearing old clothes at home. She may use aprons or overalls while carrying out activities like cooking, utensils, cleaning, dusting or mopping etc. to avoid staining and soiling the specific portions of their clothes. In the households having servants, women have different clothing than above said women. The clothes worn at home should be neat and easily washable.
6. **Undergarments:** The undergarments are important part of women wardrobe. Specific underclothes are required by women at different stages of life or for different occasions. These include bra, panties, slips, etc. The markets are flooded with different types of undergarments to meet different requirements of the wearers having varied body types and needs. For example, the supporting bra, the bra with easy feeding features, the padded bra for flat busted women, strapless bra for a dress with halter neckline, etc. The undergarments should be chosen in the colours compatible with the colour of main dress i.e., white undergarments are required for white uniform or dress and dark undergarments under the dark dresses.

7. **Clothes for different stages in life:** All the women passes through certain stages of life that need special clothing like during pregnancy and lactation. During pregnancy few loose and comfortable clothes are more preferable that can be washed daily and used frequently. During lactation period also the garments need to be planned so that the mother does not feel awkward while feeding a child within as well as outside the home.

Clothes for Men

The adult men presently have become clothes conscious as women owing to the emergence of known fashion brands in the market. They are often judged by their appearance also at their work place and in many other social situations. Further clothing requirements depend on the type of job or work and other activities they involve into both at home or out of home. The men need to have critical thinking and careful planning for their wardrobe planning as per their age, profession, activities and their physique.

The adult men usually do not shop for themselves and their clothes are purchased either in the company of their wives or by their wives only. Hence it is very important for women to understand the clothing requirements for men. The following points need consideration while selecting clothes for adult men.

1. **Figures types:** Men always prefer clothes that bring out their masculinity. They use rugged look in clothes to express their athletic ability and physical strength. They want to dress up right for the occasion. Men are also anxious like women to conform others in terms of clothes. These days ready to wear garments of established brands are available for various types of figures in wide range. A tall, thin man can choose colour contrast in shirts and trousers, design in fabric, construction features like pleats at the trouser's waist line, interesting pocket detail, etc. Horizontally patterned accessories like tie, scarf, etc. are also suitable. The short and thin men should choose dress of one colour, light weight tweed and single breasted suits. A man with average figure can make choice from wide range of styles. Usually the vertical lines in dress minimize the apparent width of a stout figure; rough surface and big checks in fabrics increase the apparent size of a figure. The suits of plain, subdued patterns; shirts with moderate to widespread collars and ties with average width are more suitable for tall and heavy man.
2. **The profession:** All men are involved in one other work to earn for their families. Every profession creates need for specific clothes for different reasons like, performance, safety, distinction, identity, etc. Some profession has definite colour and clothing requirements for their employees. Now days all the professional colleges have the dress code because they want to prepare the students to dress up like the way they are expected to dress up when they enter in that specific profession. The men in "white collar" jobs are required to wear dignified dresses like business clothes. Such clothes are considered conservative made from firm and smooth suit

fabrics in greys, dark blues or browns. The shirts are either white or dull coloured, must be clean and should have smooth surface. The ties may be bright coloured and the shoes should be of leather and well polished.

The men in “blue collar” job work with machinery, tools, livestock or on land etc. Their clothes must be designed as per their requirements e.g. foreman in the factory needs to wear ‘dangree’ that allows free movement of body parts, and have special pockets for holding tools, etc. They must be made of thick, tightly woven cloth that neither snag nor tear or worn out quickly and is easy to wash. Their shoes are usually made of heavy leather with thick soles and high ankle for protection of the feet. The coal mine workers also need protective hats besides protective clothing.

3. **Dress for social gathering:** Men usually wear a dark suit, white or light coloured shirt, dark coloured tie and black shoes at formal occasions. The dress code or colour code are also practiced in formal situations like army officer’s party and the person has to dress up accordingly. But now days traditional wears (*kurta-pyjama* or *achkans*) are preferred more for social gatherings like ceremonies, festivals, marriages etc. These traditional wears are available easily in the market in varied design styles, colours and fabrics.
The simple design and sober coloured customary style dresses should be used by the men for visiting the religious places to express their inclination to spirituality and faith in the age old traditions.
4. **Sports wears:** The men are more into jogging for their fitness as well as into professional sports. The player of a specific sport/ game needs specific clothes because there is generally a reason for the traditional features of these outfits. The men who go for walk don’t really need very special clothes, however joggers are very important for those who believe in jogging or a simple walk even.
5. **Clothes for leisure time/casual wears:** The social changes like improvement in education level, income level, nuclear families, etc. have led to increase in leisure time of all the family members. This has created need for the specific garments for different leisure activities. Now days such garments are also available in the market. The traditional casual clothes for the leisure time include *kurta-pyjama* and it has been replaced presently by the casual clothes like T-shirt, tanks, shorts, Capri, Bermudas, lowers, etc. for adult men. Such casual clothes are available in different apparel brands are used by men even to reflect their status by having specific brand loyalty. White collared men are also allowed to wear casual dresses like t-shirt and jeans even at work once in a week as per the new trend observed in occupational dresses.

Other activities

The other activities that put similar demands on men and women are as follows:

1. **Clothes for night:** Now days the women prefer to change the clothes worn during the day before going to bed. The loose gown, nighty and night suits can be worn at bed time because these would be comfortable while sleeping and help the women to have a good sleep at night. While the men can use loose *kurta-pyjama*, tanks/ t-shirts and shorts/ Bermuda or night suits at night to have relaxation both physically and physiologically during sleep.

2. **Clothes in travel:** The travelling, whether for vacation or for occupation, require different types of clothes. The travelling clothes should be wrinkle resistant and less in number and can be packed easily. The existing clothes rather than the brand new clothes provide more comfort. The frequent travellers should travel light with a small range of clothes that blend together with different set of accessories.

There are other factors too that affect the clothing of women and men akin and need special consideration while planning the wardrobe. These are as follows:

1. **Season:** The clothes are the important means to get proper protection during different weathers. The type of seasons affect the types of clothes, number of clothes, the colour and design of clothes one can have. In cold areas where winter is of long duration, e.g. North India number of warm clothes will be more than the areas where weather remains hot, e.g. South India.
2. **Other needs:** The person needs additional clothes and accessories at various occasions to enhance the beauty of the dress and oneself. The items like hand bag or purse for shopping or social gathering, jewellery, hair accessories, stylish and suitable footwear, under garments, and goggles etc. These things must have harmony with the dress.
3. **The colour plan:** The colour of the dress is most important aspect that makes the wearer noticeable at any place. It should be chosen according to season and the complexion of the wearer. It is wise to select basic colour and build the wardrobe around it. Thereafter the colour of accessories should be chosen such that they enhance the appearance of the wearer. The colours in wardrobe should blend rather than conflicting. One should have the dresses as well as accessories in different colours to avoid monotony.
4. **Budget:** It is the most limiting factor that affects an individual's wardrobe. The unplanned or impulsive buying leads to improper wardrobe that does not meet all the needs of the wearer. The availability of budget, the prioritized needs of different family members affects the purchase of the clothes for adults in the family at various stages.

CLOTHING REQUIREMENTS FOR THE ELDERLY

Chronologically a person is regarded as an elder if he/she attains the age of 60 years above. The boundary between middle age and old age cannot be stated exactly because it varies in all societies. A person can be taken old by considering changes in their activities (on retirement) or social roles (being a grandparent).

The elderly often face problem in finding appropriate clothing that fits them will due to change in physical changes. Physical strength and energy is decreased, so they need easy to put on and take off clothes and easy to care for.

Characteristics of old age persons' body

1. **Physical structure**
2. **Physiological changes**
3. **Emotional and mental state**
4. **Social role and status**

Physical structure

There is no sharp distinction between the people in late adulthood and those in old age but the ageing calls for change in clothing requirements. Marked changes occur in the structure of elderly people that affects their physical activities, appearance and social participation. The physical and physiological changes that take place during old age are quite noticeable. These changes cause physical weakness, affect the posture, mobility and flexibility of the elderly and are responsible for the incidence of various health problems. The changes noticed in elderly people are as follows:

1. Alteration in the physique; body becomes shorter by progressive bending and shortening of the spinal column, a bowing of head, involution of the skeleton and degeneration of cartilage tissue.
2. development of deep noticeable wrinkles resulting in formation of folds on the eyelids, the nose, the forehead, below the chin to collar bone, hands and legs.
3. marked shifting of body fat takes place; fat cushions around the eyes and eyes ball decreases; profile of face features like nose, lips changes; cheekbones become more prominent and double chin develops and among men, deposition of fat cause an

increase in the size of neck; sagging of muscle in the arms and legs makes them appear thinner

4. the facial parts thin out while abdomen and hips expand resulting in the widening of pelvic area, thickening of waistline and protruding abdomen
5. weight gain occurs commonly
6. brown spots due atrophy of skin cells; these spots appear on the hands and the face and become enlarged with age.
7. the hair of the head tends to become gray, thin and lose its luster while bodily hair increases and become coarser
8. skin changes cause quite a lot discomfort and harm to the older persons; it becomes dry, thin and inelastic due to loss of body water, skin tears and breaks more easily, increasing the possibilities of injury and infection

Physiological changes

- skin sensitivity to hot temperatures gets reduced that may hurt the skin before it is realized by person that damage is occurring; greater sensitivity develops to cool temperatures due to decline in activity of sebaceous glands; further thinning of the skin enhances susceptibility of the elderly people to heat and cold
- the blood vessels in the skin become unable to constrict or dilate sufficiently leading to poorer circulation, a decrease in the ability to maintain a normal body temperature occurs
- heart slows down and is unable to pump blood through the body efficiently resulting in reduced energy and stamina for physical work among older people; decreased circulation underlies the cold sensitivity, particularly in the hands and feet
- blood vessels lose elasticity with age resulting in accumulation of blood in the feet and legs; this leads to swelling (oedema) in the extremities
- susceptibility to bone diseases such as osteoarthritis increases which in turn reduces the physical mobility of elderly; onset of other age related diseases such as hypertension and diabetes causes functional losses
- Ailments such as arthritis, stroke, cerebral palsy, Parkinson's disease and spinal cord injury increases the possibility of impairment of mobility.
- People with limited mobility face a skin problem called pressure ulcers due to impaired blood circulation in areas having bony prominences such as hips, shoulders, elbows, knees, ankles, and the heels of the feet.

Emotional and mental state

Few psychological characteristics related to age are passed on from generation to generation through our genes while others are consequences of real or perceived changes in our bodies with aging i.e., mental or physical limitations. Besides this, the social and cultural differences also affect emotional state of the elderly people. Due to biological, social, and psychological differences between the sexes, men and women have difference in their emotional and mental state. All these aspects influence the overall well-being of elderly.

great number of stresses caused by a broad range of events and situations are faced by elders; stresses can be physical or social or can be an ongoing part of day-to-day life or caused by sudden traumatic events. Common stresses for older people include the following:

- diseases or health conditions, possibly chronic (e.g., arthritis)
- perceived loss of social status after retirement
- death of a spouse or close friend/relative/children

These stresses lead to number of psychological and physical conditions, such as anxiety, headaches, and ulcers that affect physical health and can have an even stronger effect on mental well-being of elders. Generally, elders feel depressed and withdraw from others resulting in reduced interaction with friends and family.

Further the social contacts of the elder people also decrease that changes their psychology after retirement. Interest, attitudes and habits of elders remain fundamentally the same but physical changes take place restricting them to fulfill their desires.

Social role and status

The roles played by an individual changes throughout his life. Likewise, the elders also face shifting in their roles owing to physical and social factors. These role changes can be stressful and affect mental and physical health.

- Reduced physical functions place elders in the position of asking for help, rather than providing it.
- A family member's loss may place an elder in a care giving role.
- Most dramatic change is due to retirement; they leave work and social roles associated to it and affects economic as well as social status of an elder.
- The role of grandparent or even great-grandparent brings both new rewards and new demands.
- besides, the following factors restrict them to conduct their physical and social activities efficiently; hence elders get depressed due to their insecurities owing to inability to do the task:
 - Lessened hearing and diminished eyesight
 - Slower reaction times and agility
 - Reduced ability to think clearly and difficulty in recalling memories
 - Lessening or cessation of sex due to decline in libido

Although there are marked changes in physical and psychological characteristics of elders but people with pleasant appearance gives a boost to almost everyone and elderly are not exceptions. A well dressed, neatly groomed and attractive elder person is more sociable and has better life.

Implications for clothing due to physical changes

The above stated changes in physique and physiology affects their physical mobility, social roles and emotional status. These changes have implications on the clothing of the elders as follows:

1. **Fit:** Elderly people clothing should have appropriate fit; neither tight fitting nor very loose fitting, to accommodate changes in body size, posture and proportion. The tight garments will be difficult to put on and will exert pressure on body particularly at joint resulting in swelling of wearer body and very loose fitting garments will restrict the smooth movement of body parts. The sleeves and neckline should be planned as per the individual needs to cover up the effects caused by the shifting and loosening of

fat in body. The length between the neckline and the waistline should be increased for proper fall in garment. The unattractive sagging of the flesh and an increase in wrinkles in the arms can be covered by having a sleeve which covers the arm to a point below the elbow.

2. **Ease of dressing:** The loss of pliability and flexibility at old age leads to excessive strenuous conditions for elders during dressing and undressing. Therefore, their clothing should have proper openings and fasteners for providing ease in putting on and off the garments. The large front openings, large armholes, use of elastic in lower garments at waist and use of velcro instead of buttons and hooks or zippers will help the elder in wearing the garments without help of other person and easy application of fasteners.
3. **Problems due to temperature changes/sensation:** Elderly people clothing should be soft, light and absorbent to provide room for enhanced skin sensibility towards heat and cold; skin sensitivity and lowered physical activity. The soft clothing do not cause rashes on their dry, thin and inelastic skin, and the absorbent fabric will remove the excess perspiration from skin of the wearer quite readily which otherwise might cause tender skin to develop infection. There clothing must be warmer in winter and cooler in summer. The soft and proper sized sweaters, coats or shawls that can be put on or taken off easily with change in temperature are desirable at this age.
4. **Becomingness of clothing as per age related changes:** Elderly people clothing should have simple style, soft and smooth texture and soft colour to go well with their wrinkled and dull skin; thin, gray/white colour and brittle hair. The plain fabric with dainty designs in earthy background will be better as these matches with elders' body characteristics.

Clothing of elderly – guidelines/suggestions

As individual grows older he come across to physical problems, less finances and that too get diverted more towards additional medical cost and proper food and low key social status and roles. They spend less on their clothing although it is a basic necessity. Also, physiological changes affect the body responsiveness towards the specific environments and create problem of comfort, fit and function related to clothing. They prefer wearing garments that have been in their wardrobes since a long time rather than changing their garment with fashion. If they have to go for new clothes, they go for durable, versatile and conservative clothing.

Although number of styles are available in market today according to the needs of elderly but still they prefer tailormade or home made clothes. So while designing or selecting clothes for elderly, one should give consideration to their physical characteristics first followed by their emotional and social status.

Neat and clean clothing that fits well gives a feel of confidence to the wearer. Elder people like clothing that is easy to put on and take off by themselves or with someone's help because many times they have trouble in raising their arms, bending or leaning. Clothing that is chosen with function in mind allows more comfortable movement in daily activities. While choosing the clothes for elders the wearer's physical condition, the frequency of changing, required convenience of changing, and cost should be kept in mind. The selected or stitched

clothes should always be such that they bring dignity to the wearer, ease the pain of dressing, and save the time and frustration of caregiver. The guidelines/suggestions for clothing of elderly are as follows:

- use/ select soft and non irritating cloth materials for elderly clothing; stretchable materials will offer better comfort and cotton or cotton blends are better
- colors should be bright and cheerful, for providing better sense of health and well being; choose printed fabrics for elderly women and solid subdued colours for men
- clothes of classic styles should be designed to prevent friction sores or bruising; full yoke with pleats and gathers that permit smooth shoulder and spinal movement should be preferred; loose salwar kameez offer better ease of wearing to older women than saree and loose t- shirt and *ghagra* offer more ease of wearing and movements during summer season; wrap styles are more comfortable
- round and V-shape large necklines should be used to cover and accommodate slant structure of the elderly persons; large necklines and easily identifiable front and back necklines
- body concealing clothes with long sleeves; length of sleeves can vary from $\frac{3}{4}$ to full sleeves; elders prefer dresses with raglan sleeves rather than set in sleeves and wider sleeves allow greater ease of movement
- waistlines should be loose enough to expand when the person is seated; pants with elastic waistbands offer better comfort
- large button and fasteners instead of small one's as these are easier to work with; velcro will be an efficient option for those having less finger mobility
- pockets in tailored dress are most desired feature in elder clothing to carry belonging; loose front pockets are more accessible
- winters clothing should include loose woolen sweaters for men and women with large neck and warm head coverings (caps/ bands for ear cover/ mufflar); cardigans offer better comfort than pullovers in wearing
- tube socks are easier to put on, because they have no heels
- shoes and slippers should have good fitting to allow safe mobility
- shoes with velcro closures allow proper width adjustment and thus prevents swelling
- front fastening bras should be used, if required otherwise a cotton vest should be used; not wearing a bra/ vest may lead to soreness and discomfort at bust level

ELEMENTS OF DESIGN

Design is the organized arrangement of one or more elements for a purpose which may be functional, structural, decoration or communication. The elements of design are also known as:

- building blocks of a design
- basic units of a visual image
- tools through which we can communicate our structure, thoughts and behavior

Each element of design has specific aspects that influence its use in different garments to create varied effects in them. All the elements are equally important and have their specific limitations. Every design need not essentially include all the elements; their use depends upon what is desired out of the final design and which element helps to communicate the planned effect. The use of the elements in any creation is controlled by the guidelines called the principles of design.

Elements of design are as follows:

1. **Line**
2. **Form and shape**
3. **Space**
4. **Colour**
5. **Texture**

LINE

Line is one of the basic elements of design; refers to the continuous movement of a point along a surface. The lines commonly used in garments can be broadly categorized as following two types:

Straight line

On the basis of direction, straight lines are further divided as follows:

- Horizontal
- Vertical
- Diagonal

- Curved line

Further the lines can also be classified on the basis of the combination of its characteristics like direction, thickness and strength as follows:

- Zigzag
- Wavy
- Thick
- Thin
- Smooth
- Dash
- Dotted

SHAPE AND FORM

Shape and form are the basic elements of design.

Shape is a flat, two dimensional area enclosed by a line. The shapes are composed of lines; hence their direction and character modify the apparent size and shape of the wearer besides communicating emotions and state of mind.

Form is a three dimensional area with height, breadth and depth measurements, enclosed by a surface. These may vary in size or in the area they occupy. Since forms are also composed of lines, their characteristics affect the functions of form in the garment as follows:

1. affect the size of the wearer
2. accentuate the desirable features and camouflage the undesirable features of the wearer

SPACE

Space in the design refers to the extent that enables the existence and organization of the elements within it to create design; it connects and separates elements to create complete whole. The space in the garment has following specifications:

- area provided for a particular purpose
- have two dimensions or three dimensions providing depth
- includes the background, foreground and interstitial ground
- two types of space: positive (enclosed) and negative (around the shape)

The space as background is critical in the garment and functions as follows:

- defines the shape
- advances or reduces the size of the object
- describes position of the object in the garment
- create illusion of size and distance

COLOUR

Colour is most versatile and strikingly visible element of design. It adds to the life 'the zing' in terms of physical and psychological effects on the wearer as well as the observer. It speaks and attracts the consumer to the store for purchase more than style and texture . It

is the first art element, even before style, that makes one to pause at a particular garment on a store rack. The colour reflects the personality characteristics and mood of the wearer. Besides this, the colour in apparels creates optical illusion, thereby helping the wearer to camouflage the undesirable features and to build his false figure image.

Colour is the result of physical phenomenon (reflection of light waves) and its perception by the interaction of eye nerves and brain. Colour has three characteristics namely, hue, value and intensity. Among different characteristics, value is most critical; refers to the relationship between lightness and darkness of a surface or object and gives objects depth and perception; also referred to as tone.

Colours can be classified as

- cool and warm
- advancing and receding
- primary, secondary and tertiary

TEXTURE

Texture is one of the basic elements of design; to the perceived surface quality of an object or substance. In apparel design it offers a visible and tangible medium to work that appeal to at least three senses namely, touch, sight and hearing to create the impression of design. Thus it defines the general characteristics of a design.

It depends upon the characteristics of its components namely, fibre, yarn, fabric and finishes. The texture has three aspects namely, surface characteristics, hand of the fabric and visual effects depending upon reflection of the light.

It is very critical element in apparel over which other elements and principles are applied to create a pleasing and becoming outfit for a specific wearer. Besides this, it plays important role in affecting the functional aspect of the design i.e., affects the comfort as well as thermal regulation of the wearer.

LINE

Definition and concept

Line refers to a continuous mark or a track of the moving point, may be straight or curved or the connection between two points.. Line performs the following functions:

1. connects two or more points along a continuous path
2. guides the eye in the direction of movement of the line
3. divides the area through which it passes, i.e., create a breaking point in space
4. defines a shape or silhouette
5. communicates a mood or character

Aspects of lines

It refers to the attributes or characteristics or features of any line. Every line possesses certain aspects that define its effects in different situations. There are nine aspects that are possessed by every line. Each aspect has a number of variants. These aspects of line and their variants are as follows:

	Aspect	Variants
1.	Path	Straight, curved, bent, looped, scalloped wavy ,zigzag, crimped
2.	Thickness	Thin, thick
3.	Evenness	Uneven, even
4.	Continuity	Continuous (unbroken), broken (line/dot) , combination

5.	Sharpness (edge)	Sharp, fuzzy
6.	Contour (edge)	Smooth, shaped
7.	Consistency	Solid, closed, smooth, porous
8.	Length	Long, short
9.	Direction	Vertical , horizontal , diagonal

Effects of line

1. The most effective aspect of line is its direction because it
 - leads the eye over the design
 - emphasizes the body
 - creates dominant illusions in dress
 - expresses different moods and emotions as follows:
 - Vertical lines suggest firmness, stability and strength in garment.
 - Horizontal lines convey quiet, repose, rest, passivity, calmness and serenity in garment.
 - Diagonal lines seem unstable, busy, active, dynamic, restless and dramatic.
2. The power of a mood depends on how line aspects are used. The communicative powers of line can be used to emphasize a message; a thick, solid, even and continuous line creates necessary impact and urgency.
3. Numerous combinations of the aspects of line can occur and every distinction will make the entirely diverse effect. For example, by using a wavy and solid line of varied thickness, sharpness, and consistency, different psychological effects can be created in garments.

Structural and Decorative lines in garments

Different types of lines exist within any garment; contributed by different structural and decorative means. Broadly these lines can be classified in two groups as follows:

- **Silhouette line:** refers to the outline/ outer shape forming boundaries in garments
- These are the most important lines as they convey the outline, or general shape and is formed by the structural components
- These are visible even from distance in the very first view and creates the lasting impression
- **Interior line:** refers to the lines that fall within boundaries in garments
- These are also the important lines in apparel design with various functions as to create optical illusions, divide areas into shapes and spaces and develops rhythm in a design, causing an emotional response

- Interior lines affects the physical and psychological composition of the wearer
- These are formed by both structural and decorative components and are not visible even from distance in the very first view always

These two types of line combine to make a composite of the overall design or style.

Effects of lines

1. **Optical illusion in garments**
2. **Line illusions**
3. **Shape and space illusions**
4. **Physical effects & Psychological effects**

1. Optical illusion in garments

The garments are composed of elements of designs that are regulated by the principles of the design such that they create physical and psychological effects. Beside this the interaction of different elements and principles of design create visual illusions. There are two types of illusions; static and self moving

2. Line illusions

- The optical illusion created by the line is caused by:
 - the direction that a line takes; in all lines are of same length but the line direction creating a illusion of shortness **(b)**, stopping the eyes with horizontal line **(c)** and producing line with greater height **(d)**. Similarly in the angle between the lines is producing a broad or narrow effect when the angle is extended or lessened.
 - the division of space, **(a)** rectangle divided by vertical line looks narrower than the one by horizontal line, **(b)** similarly rectangle with close stripes look narrower than the rectangle with stripes far apart and **(c)** shows that diagonal breaking the rectangle starting from top make rectangle narrower than the one starting from the side.

The optical illusion created by line causes:

- increase or decrease in length
- increase or decrease in width
- continuity in line after the break
- enhance or reduce overall apparent size

4. Shape and space illusions

The optical illusion created by the shape and space are as follows:

- The size of object and their grouping will create emphasis in the design thereby diverting the attention of the observer from less desired feature of wearer. These illusions add apparent width and narrowing effect in the dress.
- the filled and unfilled space . Garment showing filled and unfilled spaces
- small and large area
- the figure and ground illusion

Physical effects & Psychological effects

Physical effects

The lines in the garments create physical effects due to its various aspects as follows:

- The path of the line emphasizes body contours; straight lines oppose body curves tend to be figure concealing and curved line emphasizes angularity and roundness
- The thickness of the line affects weight; adds or minimize weight
- The continuity line reinforces smooth lines, emphasizes body bulges and the broken lines emphasize irregularities
- The line edge emphasizes area; either smooth or gently increase in area and size
- Vertical lines emphasize longitudinal direction and add length while short line breaks the spaces
- The direction of line increases or decreases lengthen/ narrows and shorten/widen

Thus by the use of lines of different size, shape, thickness, continuity, path, direction in the garment one can emphasize the good features and camouflage the undesirable ones to enhance the body structure and appearance.

Psychological effects

The lines in the garments also convey the mood and personality of the wearer.

- Use of straight and curved line in a garment reflects masculinity or femininity respectively.
- Vertical line/ straight or bold lines communicates the feeling of dignity, strength, stability, rigidity, grandeur, gentleness, poise and also express force and alertness. Smooth vertical lines convey preciseness, steadiness, and stiffness.
- Horizontal, straight, continuous, smooth line running crosswise adds weight to the garment and suggests a feeling of rest, repose, quietness, calmness, passivity and serenity
- Garments with sharp points imply crispness and liveliness whereas curves communicate a feeling of softness and femininity. Both depict youth behavior.

Structural and decorative use of line in garments

The lines can be introduced in the garment by two means as follows:

1. **Fabric features:** It includes stripes (woven/print) ,ribs (plain rib/ corduroy), wales (twill weave), surface enrichment (painting, embroidery)
2. **Structural seams and components:** It includes seams, darts, garment edges, pleats ,hems , stripes, geometrics, tucks , panels (, princess lines , gathers, draping, cuffs, topstitching, row of buttons , smocking, quilting, shirring, hemstitching, binding, piping , yokes , etc.
3. **Decorative trims and accessories:** It includes ribbons , trim, braid, belts, sequins, pearls, beading, fringe, fur, rickrack, sash, macramé, crocheted bands, etc.

COLOUR

Colour is most versatile and visible element of design; refers to an experience that is attained as a result of two phenomena- physical and physiological. It begins with physical phenomenon that occurs when a surface absorb or reflect light selectively from the incident light rays and completes with the physiological phenomenon which occurs on stimulation of brain receptors by the reflected light rays.

Physiologically colour experience depends on an array of vibrations resulting from visual perception and mental interpretation of wavelengths that reach the eye. As such it is the concern of the physiologist, who studies the body's physical reaction to light stimulus, and of the psychologist, who studies emotional and psychological reactions. The clothing designer must control the external colour stimulus to elicit the desired internal response.

The study of colour may be approached from any one of five angles:

1. **Physiologist:** concerned with the way in which the eye receives the sensation of colour.
2. **Chemist:** studies the chemical properties of the natural and the artificial colouring materials used for the manufacture of dyes and paints.
3. **Physicist:** deals with the wavelengths of colour and its intensities.
4. **Psychologist:** how a person is affected by the colours and how colours are affected by one another.
5. **The person who works with pigments:** those who mix paints and dyes, find that mixtures of coloured pigment behave differently from mixtures of coloured light.

Colour Characteristics

The human eye can identify approximately 30,000 different colours. Each sensation of colour is outcome of blend of its different characteristics. The difference in colours arises from varied proportion or level of these characteristics of colour. The characteristics of the colour are as follows:

1. **Hue**
2. **Value**
3. **Chroma**

Hue

Hue is the name of the colour comprising of a group of specific wavelengths in the light spectrum. Hues are usually presented on colour wheel where different classes of hues are arranged in a manner to show relation among primary ,secondary and tertiary hues. Colours normally visible to us are a combination of the effects of the following:

- Properties of the coloured substance
- Properties of the light falling on it and getting reflected or transmitted (or both)
- Properties of our eyes, on which the reflected/transmitted light falls

Hue is usually the key quality of a colour to impress a viewer. The hues next to each other on a colour wheel are called as analogous or adjacent hues and those opposite to each other across the wheel are known as complementary hues. The relationships between hues on colour wheel thus help in controlling value and intensity and in developing colour harmonies.

Value

Value is the lightness or darkness of a hue on the colour wheel. The value of a hue can be varied by adding white or black colour to it. It is called a tint when white is added and a shade when black is added . Tints are considered to have high value while the shades have low value associated with them. The value of a hue on colour wheel is called normal or home value. The yellow has the highest home value and violet with the darkest home value. Tints of dark hues such as blue or violet can be darker than shades of hues with light home value. Absolute blackness or whiteness cannot be achieved in case of garments. Clothing can approach but never achieve; its effect depends on the fabric texture.

Chroma

Chroma is also known as intensity and is the brightness or dullness of a hue. It depicts the saturation or purity of the colour. The brighter the colour higher is its intensity and vice versa in case of dull colours. The neutral colours namely, black, grey and white have no intensity. A hue on the colour wheel has its highest purity which gets dull on addition of neutral and other colours. Hence, a hue is at its highest intensity only at its home value. The brightness of each hue on the colour wheel is not same; highest in case of red and lowest for violet. The variation in chroma of different hues is clearly visible on Munsell colour sphere.

Theories of Color

The theories of colour enable us to understand the different perspectives that played important role in establishing the colour as phenomenon and its interaction in the environment. There are three theories of colour as given below:

1. **Light theory**
2. **Pigment theory**
3. **Psychological theory**

Light theory

It is also called as additive colour system. According to this theory there are three primary colours, red, green and blue and is, therefore, referred to as RGB. It states that light from any source when pass through the atmosphere/ medium, it gets refracted into component hues. We get secondary hues on mixing these any two of three primary hues and white is obtained by adding three primaries in equal amount. Televisions and colour monitor colours by using the primary colours of light. It starts with dark background where red, green and blue lights mix to produce colours.

Pigment theory

It is also known as subtractive colour system. According to this theory there are four primary colours, cyan, magenta, yellow and black and is, therefore, referred to as CMYK. Subtractive colour starts with an object that reflects light and uses colourants (pigments) to subtract the portion of white light illuminating an object to produce other colours. If all light is reflected, an object appears white and when all light is absorbed, object will appear black. Colour paintings, fabric printing, etc. uses subtractive process to reproduce colour. The two colour systems viz., Prang colour system and Munsell colour system are also based on pigment theory.

Psychological theory

The psychological theory was given by Ostwald in 1916; include system based on white, black and four psychologically distinct major hues namely, red, green, blue, and yellow and with total 24 hues. Each hue has its own triangular page making the total colours as per this theory comes out to be 672 plus 8 neutral to 680. Instead of tint, shade and intensity, the dull colours are described by saturation (white), brightness (black) and tone (gray). The notation used for each colour consists of a number for hue and two letters indicating values fir white and black, respectively. For example, a light dull yellow colour can be indicated by 1ec where '1' indicates hue, 'e' the amount of white and 'c' the amount of black in the colour.

Effects of colour

The colour aesthetics affect in three ways as follows:

- By creating impression (visually)
- By creating expression (emotionally)
- By creating construction (symbolically)

Physical effects

The three characteristics of the colours may be used to affect the apparent size of the wearer. The colour illusions are easy to create and their effect is more prominent. The colours have their specific effects when seen in isolation but it gets modified on interaction with the effects of colours used in the proximity. Hence, the colour of the garments produce effects due to its

interaction with other colours in the garment as well as the colours of the skin and hair of the wearer. For example, light colours or bright intensities enlarge the size of the wearer.

Psychophysical Effects of Colour

The psychological colour effects include those which affect feelings as well as influence apparent physical properties (heat, motion, physical dimensions, density, sound and moisture) of the wearer. They arise from our associations of colour with constant daily experience which get imbibed in to us such that we react to them sub-consciously and repeatedly.

Guidelines for Combining Hues, Values and Intensities:

Combine Warm and Cool Colours

- In general, the warm colours tend to make a person larger; hence can be used by thin and small figure individuals while cool colours soften the contour lines and will make the wearer appear smaller. Also warm colours provide comfort in winter and the cool colours in summer owing to their association with hot and cold entity in the nature, respectively.
- Contrasting colours make each other seem more intense when used together.
- Warm colours make cool ones seem cooler, and cool colours make warm ones seem warmer.
- The duller a colour, make its complement look brighter.
- A dull colour is more likely to emphasize, through repetition, other colours related to it. For example, a camel coat (orange hue) would emphasize blond hair and creamy skin more than it would blue eyes (complementary colour).
- An unequal amount of warm and cool colours are most pleasing because the colour combination will create a unified idea of either warmth or coolness.

Combine Light and Dark Colours

- Variation in value creates interest. Strong light and dark contrasts are the most striking. For example, light cream with dark brown is more striking than dark tan with medium brown.
- Make pleasing combinations of natural colours and combine a lighter warm colour with a darker cool colour.

Combine Bright and Dull Colours

- Brighter colour combinations look cheerful and duller ones soft and restful.
- A small amount of bright colour used with subdued colour can improve a colour scheme. Combine a bright accent colour with a dull-coloured costume.
- If too much bright colour is used, dull colours look even duller.

Psychological Effects of Colour

The colour in the garments when affects only moods, emotions, or temperament; they are called psychological effects. A lot of psychological associations of colour are culture bound

as different colours signify different things in different societies. For example, in Western cultures white is the bridal colour, symbolizing purity and innocence while in India red and green colour are used as the bridal colour for their association with love and prosperity which is desired of every relation. Warm, light, and bright colours are more interesting and exciting; cool, dull, and dark colours more calming and comforting. So the garment colour expresses an active or a quiet personality or occasion. Warm hues, light pastel values and soft intensities are more flowing, graceful, soft, and feminine while cool hues, dark values, and bright intensities imply strength and masculinity. Colours in garments depicts clearly about the age of the wearer. Warm hues appear young, happy, and carefree; cool hues seem suave, experienced, and mature. Hence, children prefer dresses in bright tints and the elderly go for dark and dull colours. The different colours are associated with phenomenon of the nature like blue-green and green of sea, trees, spring season; yellow-green, yellow, and yellow-orange, to the maturing autumn; orange, red-orange, red, and red-violet to summers and violet, blue-violet, and blue to winters. So the garments' colour depict association with the seasons also. Spring fashions are often light and neutral; in summer vivacious and cheerful colours are visible, and for winters dark and rich colours are chosen. A specific colour is believed to intrigue different emotions. A few emotions associated with different colours are as follows:

Colour	Emotions
Red :	Love, passion, power, courage, excitement, danger, sacrifice, vitality
Yellow :	Wisdom, enlightenment, happiness, cowardice, ill health, warmth
Green :	Rest, calmness, growth, envy, wealth, refreshment
Blue :	Peace, loyalty, sincerity, depression, serenity, gentleness
Brown :	Casualness, naturalness, friendliness, humility, earthiness
Black :	Dignity, formality, sophistication, gloom, sorrow, mystery
Grey :	Calmness, serenity, resignation, dignity, versatility, penitence
White :	purity, hope, cleanliness, spiritualism, delicacy, forgiveness

Value keys

In choosing the various values to be used together in a particular composition a series of value keys have been developed to aid the student in making reference to or describing a particular arrangement of values. These “keys” utilize the terms “major” and “minor” “Major” signifies strong contrast of values, while “minor” signifies little contrast or the same values. Values above medium were referred to as “high values” and those below medium as “low values” therefore, by combining these terms with the words “major” and “minor” we can arrive at the following “value keys”.

1. **High major key:** Strong contrast of dark and light values with at least five steps difference in values with high values (above medium) occupying a larger area than the low values. (They may be any hue or neutrals.)
2. **Low major key:** Strong contrast of dark and light values with at least five steps difference in values with low values (below medium) occupying a larger area than the high values. (They may be any hue or neutrals.)
3. **High minor key:** Same or similar values with no more than three steps apart on the value scale, and all above medium in value. (They may be any hue or neutrals.)
4. **Low minor key:** Same or similar values with no more than three steps apart on the value scale, and all below medium in value. (They may be any hue or neutrals.)
5. **Intermediate minor key:** Same or similar values with no more than three steps apart on the value scale and all in the middle part of the value scale. (They may be any hue or neutrals.)
6. **Intermediate major key:** Strong contrast of dark and light values with at least five steps difference in values occupying the largest area of medium value (They may be any hue or neutrals.)

Colour Harmonies

Types of Colour Harmonies

Colour harmonies provide guidelines for use of colours in combination in garments. There are two broad groups in which colour harmonies are divided:

Related colour harmonies

This group includes the hues close to each other on the colour wheel and includes the following types of colour harmonies:

- monochromatic colour harmony; light, dark, dull, and/or bright variations of one hue
- analogous colour harmony; two to four hues next to each other on the colour wheel

Contrasting colour harmonies

This group includes the hues opposing each other on the colour wheel and includes the following types of colour harmonies:

- Complementary colour harmony; two hues opposite each other on the colour wheel, the opposite warm and cool hues intensify each other.
- double complementary colour harmony; two complements and two hue next to each complements (a four-hue format) on the colour wheel
-

Suggestions for planning pleasing colour harmonies

- Any combination of colours can be made either pleasant or unpleasant, by varying values and intensities rather than using as they are found on the colour wheel.
- Colours usually appear best when they are kept in the same value relationship as that in which they are found on the value scale (natural order of values).
- A colour harmony should have a dominant colour, light or dark effect warm or cool effect, and or a combination of these.
- All light and bright values give a very weak, immature, and uninteresting effect while all dark values may appear depressing and old.
- A very bright colour and a very dull colour, both the same value, are seldom very attractive when used together.
- A group of colours in which all colours are of pure intensity often looks unrefined and primitive.
- The more contrast in value makes “exciting” and “dramatic” the combinations but too much contrast results in confusion and lacks in unity.
- When it is impossible to match exactly the hue, value, and intensity, a slight variation of hue, value, and intensity is preferable.
- The most unifying colours are the colours of light – yellow, yellow-orange, and orange.
- The grayed warm hues, which are somewhat advancing, have a tendency to unify the colours placed against them while the cool hues, which recede, have a tendency to separate colours seen against them.
- Background colours should follow the principle of the Law of Areas; intense colours should be used as small accents i.e., the smaller the area, the brighter the colour may be.

TEXTURE

Texture refers to the feel, appearance or consistency of a surface or a substance. In apparel design, texture refers to the feel, appearance or consistency of the fabric and trims that offer a medium to work. The fabric as texture is a visible and tangible substance that invokes at least three senses namely, touch, sight and hearing to provide the impression of design. It is very critical in apparel designing since it is the basic element of which apparel is made where other elements and principles are applied to create a pleasing and becoming outfit for a specific wearer. Besides this, it also affects the functional aspect of the design i.e., affect the comfort as well as thermal regulation of the wearer.

Determinants of texture

The texture of the apparel is offered by the fabric which is composed the different components namely fibre, yarn and finishes. So the characteristics of these components determine the final texture of the fabric. The factors that determine texture are as follows:

- **Fibre content:** It is basic unit of the fabric; is used directly or indirectly in making fabric depending on the techniques of fabric construction. The characteristics of the fibres that affect texture include the following:
 - Length
 - Shape
 - Chemical composition
 - Performance characteristics (strength, absorbency resistance to different components)

Few examples of fibres characteristics and resultant textures are as follows:

- Fibre (staple) - dull, fuzzy and warm in touch
- Fibre (filament) - shiny, smoother and cool in touch

The performance characteristics of fibres affect functional qualities like perspiration removal, comfort in cold and warm weather, etc.

- **Yarn content:** Yarn is made up of fibres. Different methods are there to manufacture yarns. So the quality of yarns depends upon the characteristics of constituent fibres and manufacturing method adopted. The factors that affect yarn characteristics include the following:
 - Fibre characteristics
 - Processes used in different manufacturing methods

- Quantity and type of twist
- Count of yarn
- Number of ply
- Type of yarn
- Finishing process

Few of yarn characteristics and resultant textures are as follows:

- Fibre type(staple/ filament) - dull/shiny, fuzzy/smooth and warm/cool in touch
- Carding/ combing - fluffy/ thin (eg. Woolen and worsted yarns)
- High or low count - fine/ thick
- Amount of twist - smooth/ rough, soft/ harsh and fine/ thick
- More or less number of ply - thick/thin
- Simple or novelty - smooth/ irregular (loop, knot, bulge, etc.)
- Texturing (finish) - textured, elasticized and high bulk

Besides surface texture, the yarn characteristics also affect the functional and performance of the fabric.

- **Fabric structure:** There are different methods by which the fabric is made; each method varies in the type of raw material required, type of technology used and finishing technology. The different methods of fabric construction are as follows:
 - Weaving
 - Knitting
 - Braiding
 - Knotting
 - Lace making
 - Felting
 - Non woven

Each method and its varieties either interlace or interloop or interlock the raw materials in different manner resulting in varied surface structures. The characteristics of fabrics manufactured by different methods are as follows:

- Woven fabrics have strong, stable and different surface structures
- Knitted fabrics possess greater flexibility, wrinkle resistance, stretchiness and qualities which permit garments to follow the body contours.
- Non woven fabrics have less strength and rough surface
- Lace, net, crochet - are also less strong but provide delicate impression to the part of garment where applied.

Besides this, the direction in which a fabric is used also affects its appearance and function; it is due to position of fabric grain. A fabric will have good drape and better strength when on grain but lacks flexibility and vice versa in case if fabric is biased and cross grain . Thus fabric grain affects the shape and draping effects a lot in apparels

Now days when technical applications are increasing in different sectors, numerous new techniques are emerging that produce the fabrics with different structures although they serve

less for apparels due to their thick and firm texture. For example, bonded or laminated fabrics.

- **Finishes:** The manufactured fabrics are usually finished with different processes to improve their appearance (embossing, bleaching, flocking, dyeing, etc). as well as performance (permanent press, anti static, absorbency, resistance to wrinkles, shrinkage, moth, mildew, flame retardency, etc.) and thus make them suitable for numerous end uses. These finishing processes make use of heat, pressure and chemicals to produce varied effects on the fabric surface.

Aspects of texture

There are three aspects of texture as follows:

1. **Surface characteristics;** surface being 2-dimensional and flat in nature, its characteristics are perceived by sliding the finger tips over it. The surface qualities involve surface contour (rough to smooth), surface friction (harsh to slippery) and thermal disposition (cool to warm). Few other terms used to describe textures on basis of Surface quality (2-D quality) include cracked, curly, delicate, embossed, feathery, fine, fuzzy, glazed, granular, hairy, metallic, porous, ribbed, satin, scaly, silky, uneven, velvety, etc.
2. **Hand of the fabric;** tactile qualities of a manipulated 3-dimensional substance are perceived by holding it in hand and by applying force in different directions. It comprises of flexibility (pliable to stiff), compressibility (soft to hard), extensibility (stretchy to non stretchy), resiliency (spring to limp) and density (compact to open). Few other terms used to describe textures on basis of hand (3-D quality) include airy, brittle, bulky, coarse, crisp, delicate, dense, even, fine, firm, flexible, fluffy, harsh, leathery, papery, perforated, porous, rigid, silky, solid, supple, thick, thin, tough, uneven, etc.
3. **Visual qualities of surface and substance;** depends upon reaction to light. Different textures, owing to their specific characteristics, react to light in distinct manner. A texture can react to either of following three ways:
 - admit
 - absorb
 - reflectMost textures react in at least two ways while a few even react in all three ways. So the influence of each texture varies from each other. The types of texture on basis of their reaction to light can be classified as follows:
4. **Transparent texture** admits nearly all of the light; allows one to clearly distinguish objects and details through it.
5. **Translucent texture** admits sufficient light; allows one to identify incomprehensible silhouettes behind it but not enough to single out details.

6. **Opaque textures** admit little or no light; effect depends on whether they absorb the light or reflect it.

Few other terms used to describe textures on basis of reaction to light includes dull, glossy, iridescent, lustrous, matte, polished, sheer, shimmer, shiny, sparkling, etc.

The reaction of light is quite outstanding and different in case of pile fabrics because of the nap present in them which strongly manipulate light reaction; when the pile fibres lie in one direction and viewed from same direction, the surface looks lighter and shiny because of reflection of light; but if looked from opposite direction, it appears darker and rich in effect because of absorption of more light between the fibres.

The combination of surface, hand and visual characteristics involve response of the texture to body movement and behaviour of a texture in combination to other textures. It regulates use of selection of fabric for different components or layers of the outfit.

Effects of Texture

The texture produces physical and psychological effects.

Physical effects: The different textures affect the appearance of the wearer. The texture of garments if is similar or dissimilar to that of the wearer's skin texture, it will emphasize the person's textures by either reinforcement or contrast. For example, satin will flatter smooth skin and will highlight the porous and wrinkled skin making it appear rougher whereas the opaque, somewhat harsh and firm fabric calls less comparison between fabric and wearer's skin. The different figure types and suitability of different textures to them are given in **Table**

Sl. No.	Type of figure	Suitable texture	Examples of fabric materials	Effects produced
1.	Thin	Glossy, stiff, crisp, heavy fabrics	Organza, spun cotton, corduroy, velvet	Enlarge the apparent size as a result of amount of light reflected by shiny surface; hanging away from body contours by stiff or crisp fabric; addition in bulkiness by pile and fuzzy fabric.
2.	Slender	All type of material can be used i.e., shiny and dull, limp and crisp, heavy and light and transparent fabrics	Satin, silk, organza, organdy, poplin, fur, velvet, corduroy, chiffon	Reveals body contours, emphasize angularity and softening of the figure.
3.	Heavy	Dull and medium weight	Cambric, poplin,	Tend to decrease the size and

		fabrics	spun cotton	contour lines of the wearer
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- **Psychological effects:** The textures used in the garments also reflect the mood and attitude of the wearer. The psychological perception of the wearer occurs due to the visual, tactile and audible sensations of different textures.
 - **Visual effects:** Different textures owing to their reaction to light appear to depict age, season, sophistication, personality and occasion. For example satin depicts sophistication, chiffon show delicacy and the opaque, firm and sturdy texture illustrates sporty mood.
 - **Tactile effects:** The texture of the fabric is felt by the wearer from inside as well as from outside of the garment. This feel of the texture also suggest a particular mood. The softness and warmth of the flannel describes the cozy comfort required for sound sleep. The firm textures as worsted fabric reflects formality in the environment. Likewise silk depicts sensuous mood and firm but pliable depicts ease in movement and sense of freedom.
 - **Audible effects:** Some textures also emit sound on friction that describes different moods of the wearer. For example, the rustle of taffeta or swish of satin depicts elegant mood, leather crackle suggests sporty mood.

SHAPE, SPACE AND SILHOUETTE

Definition and concept

Shape refers to the contour of the two dimensional object and when third dimension adds to it, the shape becomes a form that has volume (hollow interior) or mass (solid interior) of its own. In garments, shape is thus a flat, two dimensional area enclosed by a line. These shapes are formed by the internal lines present in the garment within the silhouette lines. These internal lines are contributed by the structural components (collars, belts and pockets) as well as the decorative surface components (pattern, trims and embroidery) in the garments.

The human body is a three dimensional solid mass while the structural framework of the garment are hollow forms. The interior volume of the garments relates to and matches the exterior contours of the body to give a pleasing look to a dressed individual.

Shapes in garments

Different types of shapes are used in garments.

These shapes and forms can be incorporated in the dresses by two different means:

- Structural means: It can add both two dimensional shapes as well as three dimensional form in the garments.
- Decorative means: It can add only the two dimensional shapes in the garments.

Few of the shapes/ forms, the means of insertion and garment feature or parts depicting them are as follows:

<u>Shape/ form</u>	<u>Means of insertion</u>	<u>Garment Feature/ Part</u>
Square/ polygon Circle/oval Triangle Diamond Teardrop Trapezoid Heart	Structural	Pockets Yoke Collar Necklines
	Decorative	Pattern Trims Cutwork (embroidery)

Sphere/ ovoid Cone Box Trumpet Hourglass Dome	Structural	Puff sleeves Skirt Formal gent's suit Skirt/ lehnga Evening dress Skirt
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Guidelines for using shapes and forms in the garments:

- It must balance the structural, functional and decorative aspect of design
- Different parts are in proportion to each other and to the whole garment resulting in the pleasing harmony
- It should not be too concealing or revealing or distorting; should be accentuating the desirable features of the wearer by repetition or contrast and camouflaging the undesirable ones

Visual effects of shapes

The shapes in the garments affect the physical appearance as well as the mood of the wearer due to the visual effects created by the shapes used in the garments. A person can design garment that will overcome the shortcomings of the body features by adding or reducing the length, width and weight due to the visual effects created by forms and shapes in the garments. These visual effects of shapes are as follows:

- the lines in shape highlight its dominant direction whether the entire silhouette or any one part; used carefully to increase/ decrease the length or width of the specific body part or the entire body of the wearer; can be done by placing seams, pleats, armseye, necklines and waistlines at appropriate places
- diagonal shapes affects more to the surrounding lines, shapes, and spaces as compared to horizontal lines
- close fit garment styles reveal the actual body contours; can be used to highlight the desirable features; curves and straightness in garments oppose angularity and rotundity, respectively; for example, by using belt at waist line one can highlight the narrow waist of the wearer.
- Loose fit garment styles conceal the actual body contours; can be used to camouflage the undesirable features; for example, by using dome shape skirt, one can add weight to narrow hips or conceal heavy hips/thighs or the short length of legs
- advancing elements (colours and textures) produce depth while flattening elements smoothen the body curves
- silhouette affects initial size and shape impressions; then each part of the garment is interpreted in relation to each other and the whole
- hems and edges emphasize the part of the body where they end ; for example, the necklines affect the beauty of face and neck
 - equal division of the area in two halves suggest the shortening effect while unequal division help to project pleasing appearance

- the lines in the shapes also convey psychological moods; for example, straight lines reflect masculinity while curved lines reflect the femininity

Guidelines for choosing shape and form

The shapes and forms incorporated in the garment not only enhance appearance of the wearer by affecting their beauty but also create false impression about the apparent size of the wearer and play important role in conveying his mood in a specific situation. So care must be taken for their appropriate use in the garments. A few basic guidelines for choosing shapes and forms for a garment are as follows:

- Decide on number of shapes or forms to be used in the garments; it may be one or in combinations; when combination of shapes or forms are used, they interact with each other and create an summative impression, so they should be chosen on the basis whether one need to reinforce, modify or obscure the dominant characteristics of direction and shape in the garment. This calls for an understanding about:
 - where lines, shapes, forms and spaces have to be repeated or resembled in a form or direction, so that they reinforce its effects
 - where new lines, shapes and spaces have to be countered or varied from original shape, so that its effects will be modified,
 - where countering is extreme, or additional lines, spaces and shapes are different, such that the original form will be lost, new ones are created and its effect will be destroyed.

The effective garment thus has a harmonious relationship among shapes of parts and between parts and the whole to reflect its integrated composition and unity to convey the beauty and mood of the wearer.

SPACE

Space is the continuous expanse in which the things exist; in a garment it is the area or extent or the interval between the points and objects. It may be either two-dimensional (flat) or three- dimensional (hollow or having volume). It is fundamental in apparel design as it offers the empty area into which the other elements of line, shape, colour and texture are placed .Space can be organized by introducing lines that subdivide, rearrange, push and pull or else manipulate it. A space can be:

- enclosed (within a shape)
- unenclosed (surrounding a shape)
- interstitial space (between unconnected shapes)

Further the space can be:

- empty; also called as open, unbroken, plain or
- filled; called as closed or broken

One must, clearly understand the distinction between shape and space. There are certain key factors that influence ones perception of shape or space; these are as follows:

- size
- overlapping
- density
- convexity or concavity

- characteristics of the enclosing lines

Functions of Space as background

The space as background in the garment functions as follows:

- defines the shape or gives form to an object by identification, isolation and distinction; for example, the plain background help in putting the accent on pocket, yoke , band, belt, pocket or jewellery
- advances or reduces the size of the object; for example, the large shapes that are filled and have bold outline seem to advance on the plain background
- provides a structure for describing position/ location of the object in the garment
- provides rest or pause in the form of interstitial space that is present between the shapes
- create illusion of size and distance as it seems to be behind the shapes
- establish a complementary relation with the objects (shape) in the garment

SILHOUETTES

Silhouette refers to the contour or outline of an object or a view of a person, object or scene ,in fashion it describe the line of clothing and the shape it gave the body i.e., indicates the exterior line that is usually created by the structural seam or component or cut and shape of the garment.

Types of Silhouettes

There are three basic types of silhouettes in garments:

- straight or tubular
- bell shaped or bouffant
- triangular or back- fullness

Each of these silhouettes represents a geometric shape.

- tubular a silhouette represents rectangle
- bouffant silhouette represents triangle and hourglass shapes
- back fullness silhouette represents the triangle

PRINCIPLES OF DESIGN

A principle of the design refers to the guideline that regulates the various elements of design that give structure to the ideas. There are different types of principles that work in coordination to assemble elements to create aesthetically pleasing designs. The different principles vary in degree of power they can apply on the elements of design in their organization. These are categorized into three groups as follows:

- Linear principles
- Highlighting principles
- Synthesizing principles

2. Linear principles

The principles that emphasize the line of eye movement in a design by organizing the elements in a specific direction are called as linear principles. They enable movement of the eye on the entire body in a specific direction. These principles assist the synthesizing principles to create more meaningful arrangement of elements in design and are simplest in application. Rhythm is an excellent example of linear principle, created through gradation, alteration, parallelism, repetition; gradation and transition are the linear principles.

3. Highlighting principles

The principles that enable the eye movement to culminate at a specific point in a design by using elements in dominant and subordination manner are highlighting principles. These principles create the focal point in the design enabling the wearer to emphasize the desirable features. Emphasis through contrast and concentricity are the examples of highlighting principles.

4. Synthesizing principles

The principles that hold the eye on the entire design of the garment; its different parts separately and as components to the whole are called synthesizing principles. These are the basic principles that organize the elements in an effective manner in a design and their application in design is most complex and difficult. Proportion, scale, balance, harmony are the synthesizing principles.

PROPORTION

Definition and concept

Proportion describes the relationship of various components of the design to each other and to the whole. It is the outcome of relationship between the distances, size, amounts, degrees or parts in a design. It can apply to one dimensional line, two dimensional shapes or three dimensional forms. Proportion is a synthesizing principle that calls for examination of parts and a complete whole followed by pulling them collectively to create and integrate on perception. The relationships of proportion can work on any or all of following four levels:

- Within one part of a design
- Among different parts of a design
- Between a part to whole design

Conventionally, proportion deals mainly with divisions of lines, shapes or areas in apparel that affects the proportion of textures, colours or pattern in a design. Every proportion of lines, shape or form in a design does not result in pleasing effects. There are some guidelines that have been established and considered for many centuries and well accepted in many cultures. An equal division of a line or two dimensional shapes appears least interesting followed by extreme unequal division that appears somewhat interesting. The most interesting division is unequal division of line and 2-D shapes but the one where the smaller part is large enough to generate interest and the larger part is small enough to encourage comparison.

The golden mean refers to the proportion which divides the complete whole such that one unit is about $\frac{2}{3}$ rd or $\frac{3}{5}$ th of the other. This proportion is well established and accepted among artists and architects alike in different cultures. This proportion is depicted in the. This figure has a square ABCD and E is centre point of line BC; taking AE as radius an arc is drawn such that it intersects the extended line BC at G and a rectangle AFGH is drawn. This results in creation of a rectangle with pleasing proportion.

The golden mean is established along a series of ratios wherein the addition of any two adjacent numbers equals the next number like 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, and so on. Any

fraction formed from two adjacent numbers, using the larger one as numerator and the smaller one as denominator results into a fraction that gives the same decimal figure. For example, $21/13 = 1.618$ and $89/55 = 1.618$.

Scale & Effects of proportion

Scale is a regular or relative relationship of sizes of different components to each other and to the whole, regardless of shapes. It is similar to proportion but it compares only sizes not shape and other attributes. In clothing, scale generally relates to the size of smaller areas (components) such as bows, pockets, colours of other style features, pattern motifs, decoration trims, jewelry and accessories, to the size of key parts of the garment (bodice, sleeve, skirt) and to the wearer.

Scale-up refers to enlarging an object in size to harmonize a larger surrounding area. **Scale down** refers to reducing an object in size to harmonize a smaller area. When size relationship agree, it is portrayed as being “**in scale**”, while it is considered “**out of scale**” or “**in poor scale**” when the relationships are either clumsy or too extreme.

The scale has powerful visual effects and invokes geometric and size and space illusion. For example, a tiny purse appears to enlarge heavy women by contrast and a large handbag overpowers a tiny person and vice versa an oversize handbag for a heavy person emphasizes size by repetition and a small purse emphasizes a person's smallness.

Effects of proportion

The proportion of the garment affects the beauty of garment itself at one end and the apparent dimensions of the person who wears that garment. Thus the proportion produces both physical as well as psychological effects as follows:

- **Physical effects:** The physical property of a garment gets affected by the proportion as it is observed against the environment, for example, the division of entire area in a garment by lines affects length and width of the garment. These physical effects in garments appear more pleasing and convincing if they follow natural divisions of the body.
- **Psychological effects:** The solidity or firmness of the shapes in the garment are also dependent on the proportion, i.e., on the divisions in the garment and the relationship among them. The larger divisions usually use reducing but otherwise important elements while the smaller one compensate by the advancing characteristics of the element used in it. Careful use of elements in different proportion enables creation of illusion in garment.

Introducing proportion in garments

The proportion can be introduced in the garment both structurally as well as decoratively. Structurally, the contour and internal lines define the proportion in a garment. The placement of seams, darts and edge finishes can be used to divide the area of a garment into shapes of different sizes that they tend to appear pleasing. In order to have those physical proportions to be functional the proportion in garment should follow the body proportion of the wearer.

The decorative aspect of design can be achieved by the use of different design elements and the principles, particularly the linear and highlighting principles. Proportion can apply to really every aspect of every element like zigzag path in connection to the dominant direction of whole line, thickness in relation to entire length, broken line distance and amount of fuzzy edges in relation to solid use, and so on. Similarly proportion in a garment can be obtained by use varying amount of different colours and textures in a garment.

The proportion in a garment, thus produced will be pleasing if it approaches the golden mean as well as interact effectively with the body proportions of the wearer.

BALANCE

Balance refers to the condition wherein different elements are equal or in same proportions in terms of size or weight. It gives the feeling of uniform distribution of weight ensuring equilibrium, steadiness, repose, stability and rest in the design. Balance in the design is so usual that one who is creating it is also not ware of it; in its absence the design lack the sense of agreement. Each part of garment must interact with all the others to achieve stability. This stability can be obtained by grouping shapes and colours in a manner the there is equal visual weight on either side of the imaginary centre in a design. Thus balance distributes the visual interest in the design.

Types of balance

There are three types of balance on the basis of the distribution of the visual interest in the design:

- **Formal**
- **Informal**
- **Radial**

1. Formal balance

It is also called as symmetrical balance; elements/ objects at each side of the imaginary centre axis is identical in each aspect of every element or very similar such that they appear as mirror images (Fig.8.5). It is observed in most of the natural and man-made things like men, animal, flowers, furniture, building, etc. It is further of grouped as follows:

- Vertical balance; is created when the upper part balances the lower part
- Horizontal balance; is created when either sides of centre axis balance each other

It is easy to create and gives maximum stability to the design. It produces dignified and serene effects; quite obvious in nature but appears quite monotonous at times.

2. Informal balance

It is also called asymmetrical balance; elements/ objects at each side of the imaginary centre axis are dissimilar in each aspect of every element or few elements. However, the end product has overall feeling of equal weight distribution. It is difficult to create in the design and is less obvious but it produces more interesting effect.

3. Radial balance

It is a combination of the horizontal and vertical balances where the elements of designs integrate around a centre of gravity to create the design. In other words, the elements of design radiate out from the centre point in a circular fashion. Hence it keeps concentration of weight near the centre.

Effects of balance

Balance is a basic and synthesizing principle, which establishes weight relationships in a design and generates a feeling of steadiness of the whole. The balance in garment design produces physical and psychological effects as follows:

- **Physical effects:** The balance produces physical effects by equal distribution of weight, density and pressure of the elements used in the design. The absence of horizontal balance in the garment worn by the figure makes it appear to tumble down, irregular or quite restrained at one hand while if present, it highlights the irregularity of the wearer. There informal balance plays important role in camouflaging them. The vertical balance provides the wearer a solid base without making the body figure to appear too heavy or simply weighted down while the radial balance make the body figure seems centrally stabilized preventing the contours from pulling out. Every aspect of each element is supposed to have an apparent weight which relates to others; the more attracting an object is, the heavier it seems. Therefore, the advancing features assume more weight and they balance with their small size the large area of a receding feature. For example, shiny texture, warm colours attracts attention and seems heavier by their apparent weight and can be used to balance a larger dull area.
- **Psychological effects:** Owing to the stability contributed by balance, it contributes psychological sense of security in design. Formal balance adds dignity and reality to the personality of the wearer while informal balance adds dynamism and appears more pleasing. Hence, elders prefer symmetrical balance while the younger people choose the designs with informal balance and this helps them to reflect the way of their life.

Introducing balance in dress

The balance can be introduced in the garment by structural seams and components as well as the components applied superficially only for decoration. The structural components like directions of seams, the draped folds, buttons, pockets, gathers, smoking are used as means to

add balance in effective manner. The decorative trims used in a garment follow the size and contour of the structural components they adorn and thus reinforce the balance in the garment.

RHYTHM

Rhythm refers to regular repeated pattern of movement or harmonious sequence of the elements of design. It is a linear principle that leads the eye easily from one part of a design to another in an easy, flowing manner. There are four basic methods of obtaining rhythm in apparel design:

- through the repetition of shapes, lines, etc.
- through a progression of sizes
- through an easily connected or a continuous line movement
- through radiation

Effects of Rhythm

Rhythm as a principle of design incorporates a sense of order or a feeling of easy movement of eye and a quality of gracefulness in the garment. It affects the arrangement of lines, forms or colors in a design that may create an organized smooth movement and thus appear rhythmic or it may be very restless, distracting and blocking in rhythm. The rhythm in garment produces the following effects:

- influence the apparent body size of the wearer by its direction and dynamics
- provide psychological satisfaction to the wearer
- continuous smooth rhythm create calm effect while jerky and irregular rhythm create exiting effect

Types of Rhythm

1. **Regular:** The regular rhythm is obtained by the normal repetition of lines and shapes in the garment in a specific sequence without altering any character of elements. This type of rhythm is introduced by linear principles like parallelism, sequence, radiation and alternation.

2. **Graduated:** The graduated rhythm is achieved on repetition of lines and shapes with gradual increase or decrease in a specific character of elements like, the thickness of line, enlargement of shape tints and shade of colours, etc. This type of rhythm is introduced by linear and highlighting principles like concentricity, gradation
3. **Random:** The random rhythm is obtained by the irregular repetition of lines and shapes in the garment without any sequence and may or may not involve alteration in any character of elements.

Creating Rhythm in Garments

The rhythm can be introduced in the garment by use of elements of design according to linear principles. The structural seams incorporated by means of darts, edge finishing, gathers, pleats, etc. create graceful rhythms in a garment. Pleats or tucks produce regular rhythm, scalloped edges in tiered skirt produce graduated rhythm and shirring, gathers, smocking produce random but intricate rhythm in a garment. Beside this, the applied means of decoration like ruffles, laces, embroidery stitches, etc. incorporate different type of rhythmic movements in the garment. Sometimes the decorative trims in a design helps to reinforce the structural rhythm in the garment. If the rhythm in garment conveys the personal characteristics of the wearer, the psychological impact of it is more prominent.

Related principles used for creating rhythm in the design is **Repetition**

Repetition is the recurrence of the feature; the feature remains same but the position varies i.e., the use of a feature in the design more than once but at different positions. It is an underlying principle for creating rhythm in a design. The repetition can be of two types:

Regular repetition: A repetition is called regular when the repeat of the feature has even spacing. The regular repetition in vertical direction increases the apparent vertical length in the design.

Irregular repetition: A repetition is called irregular when the repeat of the feature has uneven spacing. The irregular repetition in vertical direction creates the illusion of width in the design.

Parallelism

Parallelism is the continuous and equidistant placement of the feature in the design on the same plane; in case the feature is line, parallelism arranges the lines such that they never meet to each other in the design and their direction is perpendicular to direction of parallel repeat. It is also an underlying principle for creating rhythm in a design.

Sequence

Sequence is the order of succession of different features in the design where each feature has its own importance and implication. For example, the order of coloured buttons in a row does not affect the design but if a row of button of different colours has to be repeated, then the order of coloured buttons has to be same to achieve sequence in the design since there the order of colour is important. It is also an underlying principle for creating rhythm in a design.

Alternation

Alternation is the repetition of only two features in design and that too in sequential manner i.e., one after the other. It is also an underlying principle for creating rhythm in a design by combining repetition and sequence.

Gradation

Gradation is the transition of the feature in design such that a specific aspect of the feature advances or reduces i.e., the feature does not changes as such but one aspect of the feature change in the next repeat that distinguish it from the previous. For example, the use of shades of a hue in gradation creates the pleasing effect in a design. It is also an underlying principle for creating rhythm in a design.

Concentricity

Concentricity is the repeated arrangement of a feature in a manner that it has common centre for each repeat i.e., a feature increases in size without change in its point of origin as well as the shape. Hence, each repeat of the feature has the progressive increase at all the points like ripples in water when a stone is thrown. It is also an underlying principle for creating rhythm as well as focal point in a design

Radiation

Radiation is the arrangement of a feature in a manner that it appears to evolve from a centre point (visible or invisible) and emerge out as rays creating an effect along the radius of the circle. It is also an underlying principle for creating rhythm in a design. It play important role in controlling the attention to a specific portion of the garment as well as the part of the wearer.

Transition

Transition is the process of changing from one style, state, condition, position, etc. to another without any break point during modification. It makes a feature to adapt distinction in few aspects during the process of change such that it appears gliding gradually rather than jumping from one place to other. It is a linear principle that play effective role in creating rhythm in a design. It produces a gentle feeling in a garment.