SHRIMATI INDIRA GANDHI COLLEGE

(Nationally Accredited at 'A' Grade(3rd cycle) by NACC)
(Affiliated to Bharathidasan University)
Tiruchirappalli-620002

DEPARTMENT OF
FASHION TECHNOLOGY & COSTUME DESIGNING

"FOR SLOW LEARNERS"

PREVIOUS YEAR UNIVERSITY QUESTION &

ANSWER FOR THE SUBJECT "TEXTILE SCIENCE "

PREPARED BY

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TEXTILE SCIENCE

2 MARKS:-

1) Define "Twist".

In a spinning process, a strand of fibre in a more or less parallel form central axis is drafted and twisted on its own axis to form a yarn. Twist is essential to keep the component fibres together in a yarn. The necessity for twist in yarn construction can be understood from the following definitions:

According to Skinkle, twist is defined as the number of spiral turns given to a yarn in order to hold the constituent fibres or threads together.

In the Indian standards method for determination of twist in yarn, twist is defined as the spiral disposition of the components of yarn, and is generally expressed as the number of turns per unit length of yarn. For eg,. Turns per inch (TPI),turns per metre(TPM) etc.

Hence the determination of twist in yarns would involve both the direction of twist and the number of turns per unit length.

2) What do you mean by spinning?

Spinning is the art of producing continuous twisted strands of desired size from the fibrous materials.

3) Define "Shedding"?

The shedding mechanism separate the warp threads into two layers (or) division to form a tunnel known as "shed".

4) Define "Weft knitting" ?

Knitted fabrics are divided into two general types those produced by weft knitting, where one continuous yarn form courses across the fabric.

5) What do you meant by web forming?

Non wovens are defined by the American society for Testing and Materials as fabrics constructed of fibers held together " *by bonding or the interlocking of fibers or both, accomplished by mechanical, chemical, thermal, or solvent means, and the combination thereof".* The fibers are processed through a series of opening, conditioning, and blending operations.

Layers of webs of fibers are then formed. Adhesion of the fibres is accomplished by fibre friction, heat, the addition of an appropriate resin, latex, or other bonding agent.

Parallel-laid web, Cross-laid web, Random-laid web, High-velocity sprayed web, Air-laid web, Wet-lay web. In bonding the web resin bonding, latex foam bonding, gelatin bonding, thermoplastic bonding, spun bonding, spunlaced bonding, autogenic bonding, radiation bonding, composite bonding, stitch-through bonding.

6) Write short notes on novelty yarns?

The spinning process can produce decorative effects by varying the amount of twist or by twisting together yarns of different diameters, each of which may have different amounts of twist in them. Such yarns can give fabrics almost limitless textural effects of various color combinations. Fabrics made out of novelty yarns cannot generally be as durable as fabrics made of uniform yarns that have been evenly spun. A safe rule for the consumer is to remember that longer service may be expected from flat, smooth fabrics made from evenly spun yarns rather than from novelty yarns of complex character. Eg:- slub yarns, flake yarns, spiral yarns etc.,

7) Write short notes on sewing thread?

Sewing threads are specifically designed for efficient, smooth stitching that will not break or become distorted for the useful life of the sewn product. The adequacy of the thread depends upon its composition, construction, and finish as well as its proper selection for the fabric and type of seam to be used.

Construction of thread: sewing threads are made of cotton, linen, silk, rayon, nylon, or polyester. The properties of the fiber determine its use and application. For example, cotton is the most widely used because of its high versatility and low cost; rayon, which is much weaker, is used primarily for fancy stitch work; polyester is used where strength and water repellency are important.

All sewing threads are made up of ply yarns. The single yarns, which may be spun, filament, or multi component are highly twisted (plied) to form a firmer and more uniform thread may be given special finishes , such as mercerizing , glace , or water repellency to serve particular uses.

8) Write some points about Dobby and Jacquard?

A dobby is a shedding device attached to a loom for producing a variety of small motifs. The capacity of a dobby system is more than that of a tappet system in terms of the number of heald shaft that can be operated and the number of picks that can be inserted per repeat of the design. Technologically speaking, tappet systems produce a better quality of cloth than do dobby systems. In other words, healds work better and last longer with tappet systems than with dobby systems. Some example of dobby are climax dobby, lever dobby etc.

The jacquard is a shedding device used to produce large figures or patterns that are beyond the capacity of a dobby system. A jacquard system is usually located above the loom and controls a large number of warp threads independently by means of harness cords, hooks and needles. Each hook in a jacquard represents a single heald. The jacquard systems was invented in the year 1801 by a French weaver named Joseph M. Jacquard and was first exhibited at a National Exhibition of Paris. Some of the jacquards are *cross-border jacquard, twilling or damask jacquard, leno jacquard, fine-pitch jacquard.*

9) What do you mean by Rib stitch?

Rib-knit fabrics have alternating lengthwise rows of plain and purl stitches constructed so that the face and back of the fabric appear alike. This may be produced either on a flat rib machine or a circular rib machine. In both machines, one set of the needles pulls the loops to the front and the other set pulls the loops to the back of the fabric. Each set of needles alternately draws loops in its own direction, depending upon the width of the rib desired. For example, rib stitches can be 1x1, 2x2, 2x1, 3x1, and so on.

10) Write about classes of non-woven?

Non wovens are defined by the American society for Testing and Materials as fabrics constructed of fibers held together "*by bonding or the interlocking of fibers or both, accomplished by mechanical, chemical, thermal, or solvent means, and the combination thereof".* The fibers and processed through a series of opening, conditioning, and blending operations.

Layers of webs of fibers are then formed. Adhesion of the fibres is accomplished by fibre friction, heat, the addition of an appropriate resin, latex, or other bonding agent.

Methods of non-woven are Parallel-laid web, Cross-laid web, Random-laid web, High-velocity sprayed web, Air-laid web, Wet-lay web. In bonding the web resin bonding, latex foam bonding, gelatin bonding, thermoplastic bonding, spun bonding, spunlaced bonding, autogenic bonding, radiation bonding, composite bonding, stitch-through bonding

5 MARKS:-

1) Define fibre and briefly explain about cotton and wool fibre?

Fibre:

It is either spun or twisted into yarn or else directly compressed into fabric.

Cotton fibre*:*

Cotton is a fibre that grows from surface of seeds on the pods or boils. It's composed basically of a woody substance called "*cellulose"*

Structure of cotton fibre:

Primary wall:

There is a primary wall of the young cell which becomes the outer skin of the matured fibre.

Cuticle:

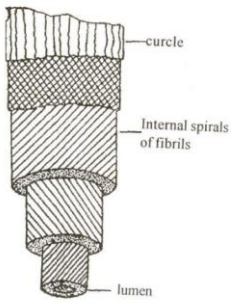
The primary wall is covered with a circular layer of wax and pectic matter.

Secondary wall:

The secondary wall constitutes the bulk of the cellulosic components and is laid down in successive layers visible as rings in the cross- section of a swollen fibre corresponding with daily growth ring in tree. Within these are minute fibre deposits, fibre which are packed along side one another running in spirals.

Lumen:

When cotton fibre is alive a centre is filled with liquid *nutrients* and *protoplasm*. When the fibre dries the liquid disappears, and an almost empty space known as the *lumen* runs lengthwise through the fibre.



Wool fibre:

History shows clearly that Mesopotamia is the birth place of wool. From early times the manufacture of woolen clothes was an important in Mesopotamia, later it had spread to Netherlands, Egyptian, Greek, America, Australia etc.,

Different qualities and grade of wool:-

i. Fine wool (Merico)
ii. Medium wool
iii. Long wool
iv. Cross- breed wool
v. Carpet wool

Out of these Merino wool represent the finess quality of wool in the market.

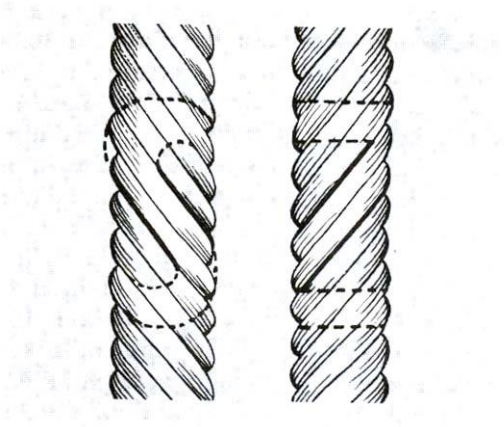
The longitudinal view of wool fibre is irregular and roughly cylindrical, prominent scale marking or flattened plates.

The cross sectional view of wool fibre is oval to circular with variation in diameter medulla is concentric and variation in size.

2) Define yarn and briefly explain about ply yarn and cable yarn?

Yarn:

Yarn may be defined as the continuous twisted strand of fibres which has received its final attenuation (thinking down), and twisted sufficiently to give necessary strength to make possible its use in twisting, weaving, knitting or other manufacturing process.



Ply yarn:

When two or more strands or yarns are twisted together, they are designated as *ply yarn.* They are termed two-ply, three-ply, and so on, according to the number used in their construction. A single yarn may be of relatively good quality; but where durability is all important, ply yarns are preferable, assuming that the yarns have the same length of staple. Good-quality broad for men's shirting's, for eg, is made with ply yarns.

Yarn construction and yarn count are expressed differently according to the kind of staple or the filament fiber used. When yarn is sold by weight but identified as to size and type by number Cotton and cotton blend yarns are designated by two numbers: the first identifies the yarn size and the second indicates the number of yarns used. For example, whereas 30/1 denotes a single yarn having a count of 30, a 30/2 yarn is two size 30 yarns piled together (this would be equivalent in size or diameter to a single yarn count of 15). Such a yarn would be referred to as 30 *two ply* or *30s two.* In the same way, 30/3s denote the use of a three strands twisted together, each having a separate yarn count of 30. A three- ply yarn, indicated by 30/3s would be equivalent to a single yarn having a yarn count of 10.

Worsted yarns, based upon the system used for spinning long staple wool into fine spinning long staple wool into fine yarn, are designated in the reverse order. For example, 1/60 denotes a single yarn having a count of 60, and a 2/60 yarn is two size 60 yarns plied together (this would be equivalent in size or diameter to a single yarn of 30). Such a yarn would be referred to as a two sixty yarn.

Linen yarns are designated by the term lea, such as 40 lea yarn, etc. they are almost never plied and, unless specifically indicated, are considered to be singles.

Filament yarns are also not generally plied. When they are, the designation is usually by the number of plies and the denier (diameter), such as three-ply 60 denier.

Cabled yarns:

Two or more plied yarns may be twisted together to form a cabled yarn. In general, it is constructed by twisted the plied yarns around each other successively in the opposite direction of the preceding twist, i.e.S/Z/S or Z/S/Z. As a result, the opposite twist direction cause the plies to grip each other and maintain adherence. These yarns are hard, rough, and strong.

3) Discuss about open-end spinning and Air-jet spinning?

Open-end spinning:

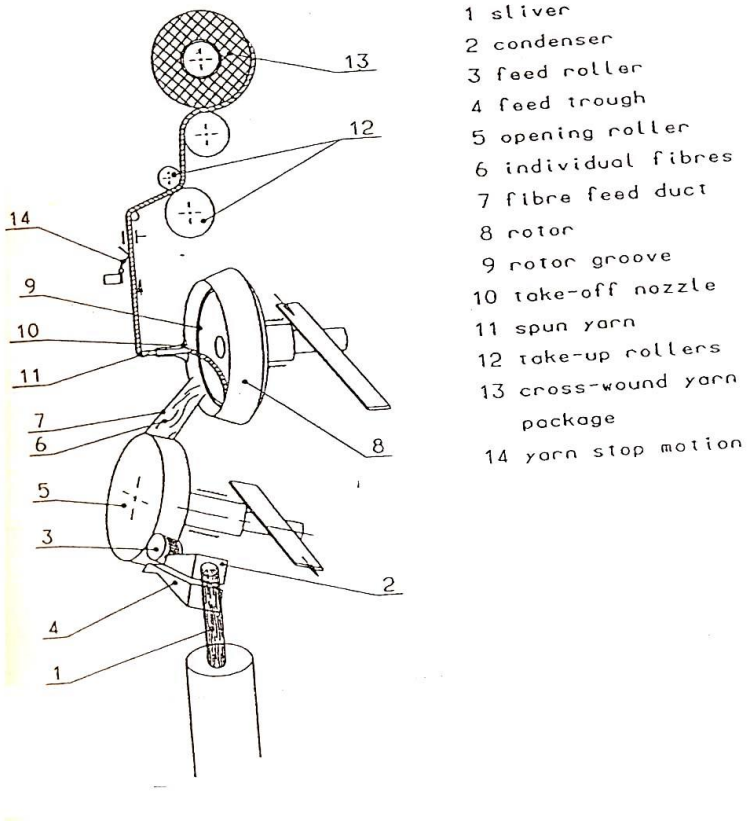
In accordance with the operational principle illustrated in figure, the rotor spinning method of operation is as follows:-

Sliver feed:

Fibre sliver (usually draw frame sliver) is fed via a condenser between the feed roller and the feed trough to a rapidly opening roller.

Sliver opening*:*

Individual fibres are combed out from the sliver, nipped between feed roller and feed trough, by the rapidly rotating opening roller and carried along in the direction of rotation.



Fibre collection in the rotor groove:

Due to the powerful centrifugal forces in the rotor and the diagonal fibre feed in, the fibres migrate on the conically shaped rotor wall to the point of greatest diameter, the rotor groove, where they are collected and formed into a mini-sliver (fibre ring).

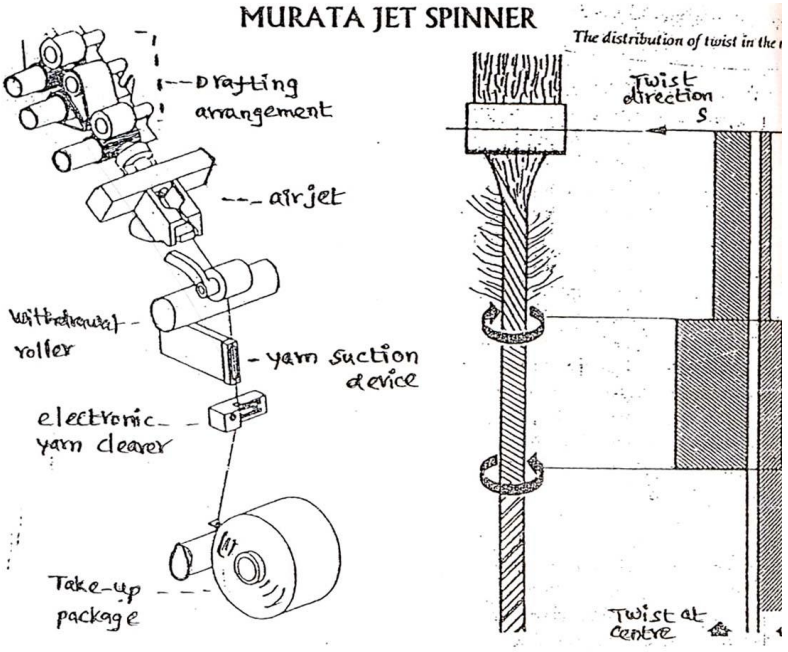
Yarn formation:

If a yarn end projects outside over the take-off nozzle into the rotor groove, it receives twist from the rotation of the rotor outside the take off nozzle (navel), which then continues in the yarn in to the rotor interior the yarn end rotating a round its axis, and continuously twisting in (spinning) the fibers deposited in the rotor groove, while the yarn formed is continuously taken up

Yarn taken up and yarn winding:

The yarn formed in the rotor is continuously taken up by a pair of rollers through the stationary take off nozzle, and wound on to a cheese. A yarn stop motion interrupts supply to the opening roller when an end breaks. Capacitive or optical sensor incorporated in the yarn path record yarn fault (thick and thin places) enabling then to be a cleared if limits are exceeded.

Air-Jet spinning



Further variation of spinning yarn with aid of an air stream was developed in Japan. It is patented pneumatic process that produces yarn directly from high quality drawing sliver of wool, manmade staple, or manmade and cotton staple blends. This air-jet spinning technique drafts the sliver to a predetermined size and passes it through rollers over a friction plate into a cylindrical pneumatic twisting chamber. As compressed air is released from jets set in the balls of the chamber at predetermined angles to the central axis of the tube, the fibers are whirled a round each other. Special rings and specific grooves within the tube are used to loosen the fibers from the sides and to control the twist and strength the parameter of the forming yarn. As the fibers are whirled through the first chamber, they are given either an S or Z twist. With the aid of air suction, the strand is past in the second chamber where it is first stabilized and then given an equal amount of twist in the opposite direction. The strand is again stabilized to prevent backtwist as delivery rolls draw off the yarn which is wound onto a takeup package.

The air-jet spinning produces a yarn of uniform diameter without thick or thin areas. However, it has some what harsh hand. Yarn can be produced in counts equal to or somewhat finer than those made by open-end spinning.

4.Explain briefly about filament yarn spinning.

Filaments are produced by different methods, and they cane be formed directly in to yarn without the use of techniques to connect fibers together to form the required the length.
There are three types of filament yarn spinning.

1) Wet spinning

2) Dry spinning

3) Melt spinning

MELT SPINNING:

Nylon-6 and Nylon-66 are manufactured by using Melt spinning methods.
The following sequence of operations is carried out:

1) The Nylon chips are fed to the copper.

2) There is an electrically operating grid which allows only the molten polymer to enter.

3) The melting temperature is 280 *C.

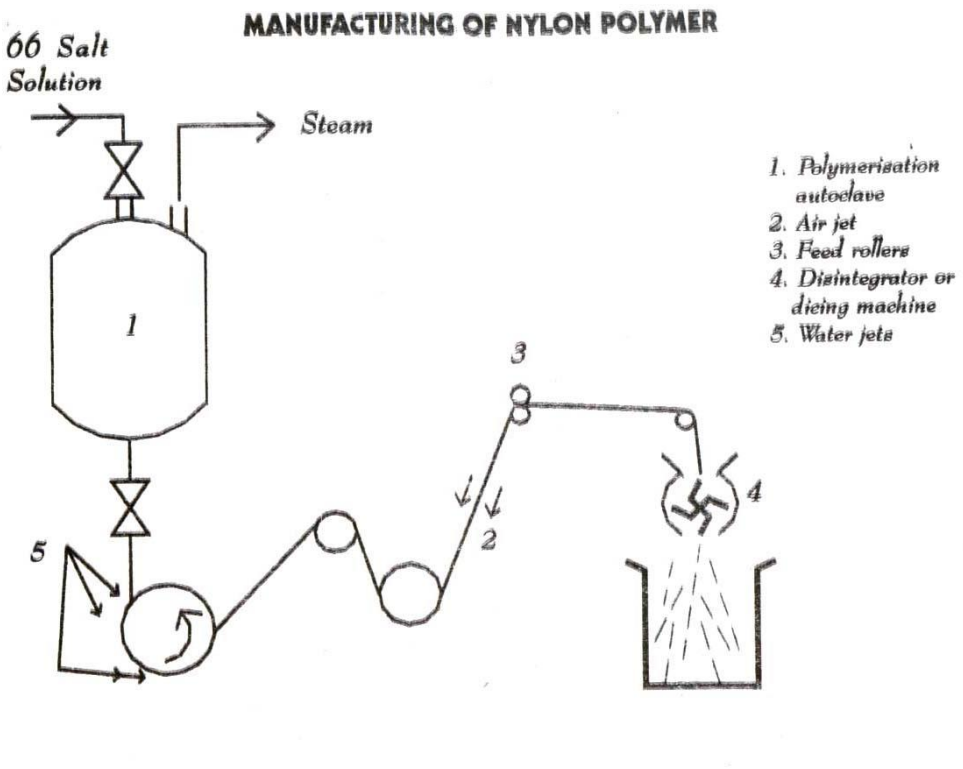
4) Maintaining Nitrogen atmosphere over the molten solution.

5) Keeping the level of the pond constant to get uniform pressure.

6) Thus the molten polymer is filtered and pumped into the spinning jet having dia 0.01".

7) It is spun into the cooling chamber.

8) Thus it is solidified and passing through the steam chamber and wound on to take up package.



A method of manufacturing manmade fiber is referred to us melt spinning. Polymer chips obtained previously reacted chemical combination are melted and then pumped through a spinneret into an air chamber. The extruded streams cool and solidify into continuous filaments and are then drawn out of the chamber, twisted and/or processed further, and subsequently wound onto spools.

Monofilament and multi filament yarns of various diameters can be produced as is done with the other extruded filament. Texture and strength are also determined by the amount of twist put into the yarn.

5) What is mean by secondary motion-briefly explain?

In order to interlace warp and weft threads to produce a fabric, the following mechanisms are necessary on any type of loom:

i. Primary mechanisms

ii. Secondary mechanisms

iii. Auxiliary mechanisms

SECONDARY MOTION:

These mechanisms are next in importance to the primary mechanisms. If weaving is to be continuous, these mechanisms are essential. So they are called the 'secondary' mechanisms. They are:

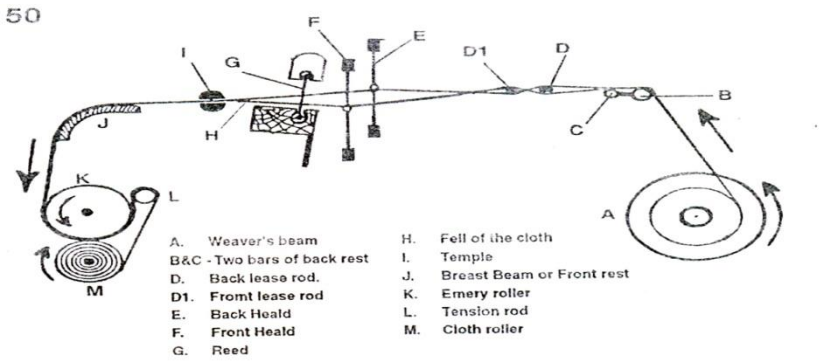
a. Take-up motion
b. Let-off motion.

Take-up motion:

The take-up motion withdraws the cloth from the weaving area at a constant rate so as to give the required pick-spacing (in picks/cm) and then winds it on to a cloth roller.

Let-off motion:

The let-off motion delivers the warp to the weaving area at the required rate and at constant tension by unwinding it from the weaver's beam. The secondary motions are carried out simultaneously.



6) Explain- types of selvedges?

As the shuttle moves back and forth across the width of the shed, it weaves a self-edge called the *selvage* or *selvedge,* on each side of the fabric. The selvage prevents the fabric from raveling. It is usually made more compact and stronger than the rest of the fabric by using more or heavier warp yarn or by using a stronger weave. There are different kinds of selvages. The kind of selvages used depends upon economy of production and the expected use of the fabric

Plain Selvages:

These selvages are constructed of the simple plain weave with the same size yarn as the rest of the fabric, but with the threads packed more closely together. Such selvages are fairly durable and firm.

Tape selvages:

The tape selvages are sometimes constructed with the plain weave but often are made of the basket weave, which makes a flatter edge. Tape selvages are made of heavier yarns or ply yarns, which provide greater strength.

Split Selvages*:*

Split selvages are made by weaving a narrow width fabric twice its ordinary width with two selvages in the center. The fabric is cut between the selvages, and cut edges are finished with the chain stitch or hem.

Fused Selvages:

These selvages are made on fabrics of thermoplastic fibers, such as nylon, by heating the edges of the fabric. The fibers melt and fused together, sealing the edges. This technique is sometimes used to split wide fabric into narrower widths.

Tucked Selvage:

The tucked selvage is a technique used on some shuttle less looms. A device is used to tuck and hold the cut ends into the fabric edge. The construction of the selvage is dependent upon the particular weave and a number of other factors. A formula for weaving the tucked selvage considered fiber density, the diameter of the yarns which is also affected by twist.

7) Define knitting and explain briefly about knitted fabrics?

Knitting is a technique of fabric formation from yarn. Knitting is the art of constructing fabrics by intermeshing the yarn loops (a loop within a loop) by some knitting elements.

For knitted fabrics capital investment is less due to less number of preparatory machinery requirements. The supply package is cone or warp beam. Productivity of knitting machine is high. It is simple operation and faster production. It requires less labour. For knitted fabrics generally coarser count is used. Moisture absorbency is more. Crease resistance is high. Knitted fabrics are thicker. No wrinkle are formed thus ironing is not required. It has good extensibility. Pleat sharpness is less. More permeability to air. It is less stronger fabrics because any small defect occurring in fabric leads to more damage in cloth, as it can not be mended easily.

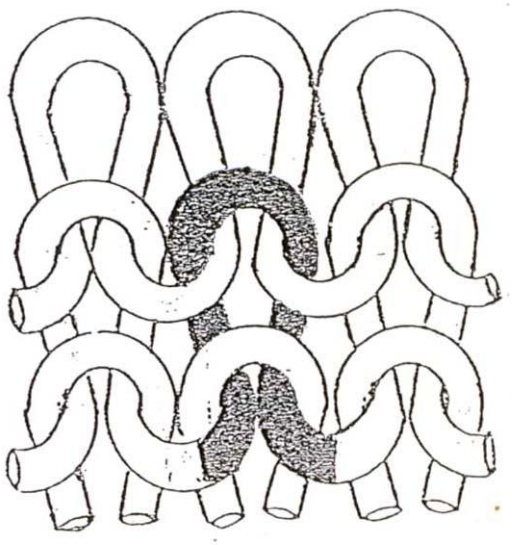
There are different types of knitting

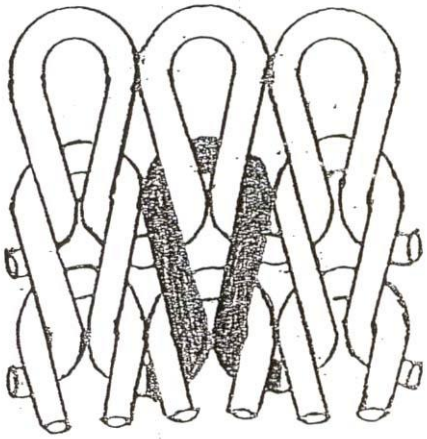
I. Weft knitting ii. Warp knitting iii. Jacquard knit IV. Pile knitting

8) Explain about plain knit stitch and rib knit stitch?

Plain knit stitch:

The plain knit is the basic form of knitting. It can be produced in flat –knit or in tubular form. The flat knit is also called jersey stitch because the construction is like that of the turtleneck sweaters originally worn by English sailors. The knitting is done with a row of latch or beard needles arranged in a linear position on a needle plate or in a circular position on a cylinder. The plain knit is made by needles intermeshing loops drawn to one side of the fabric. The loops forms distinctive vertical herringbone like ribs or wales on the right side of the fabric. On the reverse side the courses can readily seen as inter locking rows of opposed half circles. The plain knit produces a relatively light weight fabric compared with the thicker fabrics produced by other stitches.





(a) Technical Face Side

Rib stich

To produce rib stitch, it requires two sets of needles operating in between each other in a knitting machine. A rib structure is also known as double jersey structure.

Rib-knit fabrics have alternating lengthwise rows of plain and purl stitches constructed so that the face and back of the fabrics appear alike. This may be produced either on a flat rib machine or a circular rib machine.

In both machines, one set of needles pulls the loops to the front and the others set pulls the loops to the back of the fabric. Each set of needles alternately draws loops in its own direction, depending upon the width of the rib desired. For example, rib stitches can be 1x1, 2x2, 2x1, 3x1, and so on.

9) Define felted fabrics and explain briefly about it?

The art of producing fabrics directly from fibres matted together began before spinning and weaving were invented. History records that the patron saint of the felt industry, Saint Feutre of Caen, France, put wool fabrics in his sandals to make them more comfortable during his long walking trips. The pressure, moisture, and heat from his feet caused the fibres to interlock into a matted layer. Today, felt is made from wool with or without the admixture of another animal fibre, vegetable fibre or man-made fibre. Modern techniques have evolved and are still being developed to improve the quality and usefulness of such fabrics, depending upon whether felt or some related type of fabric is being manufactured, these will be different.

There are two types of felted fabrics:

a. Wool felt
b. Fur felt

Properties of felt:

Felt as known warp, filling or selvage, which simplifies it uses in garment construction. Because it does not fray or ravel, on the other hands, its structure makes sewing

difficult; hidden mending tears and holes is impossible because it is made without twisted yarns and without interlacing, felt as little tensile strength. And, it tears, it does so in a ragged, fuzzy manner. It has practically no elasticity or draping quality. however, felt can be cut or blocked into any shape and will retain its shape unless subjected to undue tension.

Wool felt has high thermal insulating properties and it provides warmth. It absorbs sound and it has much imprecision to water than untreated own or knitted fabric. Wool felts, shrinks it should be dry-clean.

Uses of felt:

Lack of tensile strength and drapability limit the use of felt as a general clothing fabric, but it is especially adaptable for blocking into hats. It is also suitable for such articles as slippers, shoe insole, earmuffs, etc.

10) Define non-woven and explain briefly?

Non wovens are defined by the American society for Testing and Materials as fabrics constructed of fibers held together "*by bonding or the interlocking of fibers or both, accomplished by mechanical, chemical, thermal, or solvent means, and the combination thereof".* The fibers and processed through a series of opening, conditioning, and blending operations.

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Characteristics of non-woven fabrics

The particular set of properties that a non-woven fabrics may have is depending upon the combination of factors in its production. The range of characteristics is wide. The appearance of non-woven fabrics may be paper like, felt like, or similar to that of woven fabrics. They may have a soft, resilient, hard or stiff or broadly with little pliability. They may be like a tissue paper or many times thicker. They may be transparent or opaque. Their porosity may range from high, free air flow to minute impermeable.

Uses of Non-woven fabric:

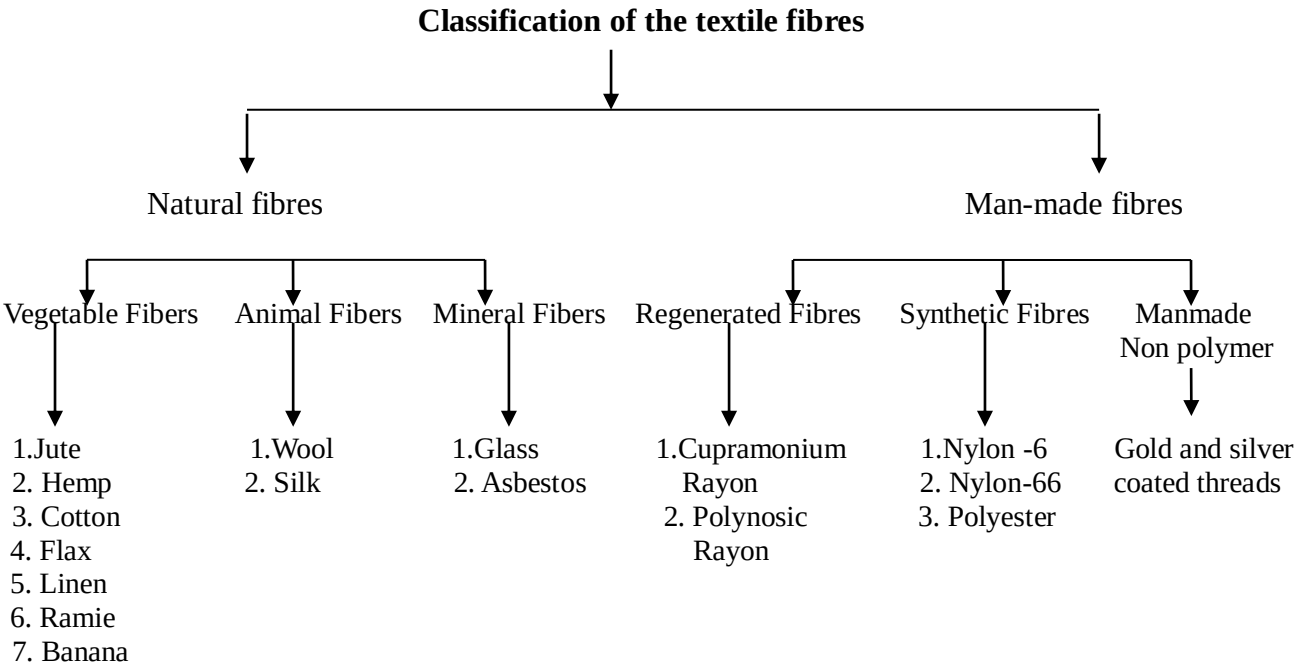
There are two types of non-woven

1. Durable non-woven have wide application. They are used for draperies, upholstery, carpet, insulation, etc.

2. Disposable non-woven are used for one time use. Some of them are diapers, sanitary napkin, surgical and industrial masks, etc.

10 MARKS:

1) **Explain – classification of textile fibres?**



The spinability of a fibre into yarn depends upon lotly on its physical properties. The essential properties are

- Stable length
- Tensile strength
- Fineness
- Spinability
- Uniformity

The desirable properties are:-

- Crimp
- Elasticity
- Cohesiveness
- Density
- Plasticity
- Resilience
- Porosity
- Color
- Luster

Vegetable fibre:-

Fibres derived from vegetable matter are called vegetable fibre. Some eg:- cotton, linen, jute, banana etc.

Cotton fibre:

Cotton is a fibre that grows from surface of seeds on the pods or boils. It's composed basically of a woody substance called "*cellulose"*

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Lumen:

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Animal fibre*:-*

Fibres derived from animal material are called animal fibre.eg:- wool, silk, etc.

***Wool fibre*:**

History shows clearly that Mesopotamia is the birth place of wool. From early times the manufacture of woolen clothes was an important in Mesopotamia, later it had spread to Netherlands, Egyptian, Greek, America, Australia etc.,

Different qualities and grade of wool:-

- Fine wool (Merino)
- Medium wool
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The longitudinal view of wool fibre is irregular and

roughly cylindrical, prominent scale marking or flattened plates.

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Silk:

Silk fiber is a fine continuous strand unwound from the cocoon of a moth caterpillar known as the silkworm.while silkworms are generally cultivated , another type, wild silk is obtained from uncultivated silkworm cocoons . The latter produces a coarser fiber .silk is essentially composed of protein.

Silk fiber is relatively lustrous , smooth ,lightweight, strong and elastic. Historically , it has always been a highly desired fiber which has been used for apparel , home furnishing and upholstery. It desirability is one of the factor that prompted the production of man-made fibres to simulate silk.

Mineral fibres

Asbestos

Asbestos is natural fiber obtained from varities of rock.it is a fibrous form of silicate of magnesium and calcium , containing iron, aluminium and other minerals.Asbestos is acid proof ,rust proof, and flame proof. Consequently , it has been used for material requiring certain of these characteristics. However asbestos fiber particals that lodge in the lungs have been found to be carcinogenous and its use has therefore been restricted .

Man made fibres:

Rayon :

There are two principal varieties of rayon now commercially produced: Viscose and high wet – modulus . These in turn are produced in a number of types two provide certain specific properties .Thus , these rayon have been made to simulate natural fibres as well as to provide characteristics of their own. Accordingly rayon is used for a wide varity of consumer and industrial products.

Non cellulosic polymer fibres:

Nylon

Nylon is manufactured fibre in which the fibre forming substances in any long chain synthetic polyamidein which less than 85 % of the amide linkages are attached directly to two aromatic rings . The elements carbon , oxygen, nitrogen, and hydrogen are combined by chemical process into compounds which react to form long-chain molecules , known chemically as polyamides , are several forms of nylon ; each depends upon the particular chemical synthesis.They are nylon 4; 6; 6,6; 6,10; 6,12; 8,10; and 11.There are different types under various trademarks within each of these forms of nylon.

Nylon is thermoplastic, resilient, elastic and very strong.It is used for a wide variety of apparel, home furnishing and industrial products.

Polyester

Polyester is a manufactured fiber in which the fiber-forming substance is any long – chain synthetic polymer composed of atleast 85% by weight of and ester of a substituted aromatic carboxylic acid , including but not restricted to substituted terephthalated units and

parasubstituted hydroxyl- benzoate units. In producing such fibres , the basic elements of carbon , oxygen and hydrogen are polymerized . variations are possible in methods of ingrediants ,and in the ultimate molecular structures of the fibre – forming substance . polyester fibers are produced by several manufacturers under their respective trademarks.polyester is used for a wide variety of apparel,home furnishing and industrial fabrics

2) Explain about modern spinning method for open-end spinning, friction spinning, electrostatic spinning?

Open-end spinning*:*

In accordance with the operational principle illustrated in figure, the rotor spinning method of operation is as follows:-

Sliver feed:

Fibre sliver (usually draw frame sliver) is fed via a condenser between the feed roller and the feed trough to a rapidly opening roller.

Sliver opening:

Individual fibres are combed out from the sliver, nipped between feed roller and feed trough, by the rapidly rotating opening roller and carried along in the direction of rotation.

Fibre collection in the rotor groove*:*

Due to the powerful centrifugal forces in the rotor and the diagonal fibre feed in, the fibres migrate on the conically shaped rotor wall to the point of greatest diameter, the rotor groove, where they are collected and formed into a mini-sliver (fibre ring).

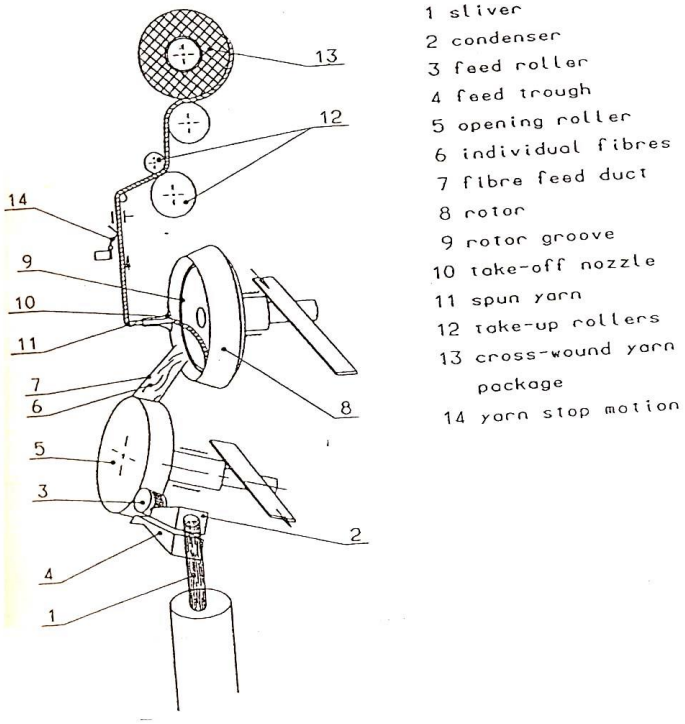
Yarn formation:

If a yarn end projects outside over the take-off nozzle into the rotor groove, it receives twist from the rotation of the rotor outside the take off nozzle (navel), which then continues in the yarn in to the rotor interior the yarn end rotating a round its axis, and continuously twisting in (spinning) the fibers deposited in the rotor groove, while the yarn formed is continuously taken up

Yarn taken up and yarn winding

The yarn formed in the rotor is continuously taken up by a pair of rollers through the stationary take off nozzle, and wound on to a cheese. A yarn stop motion interrupts supply to

the opening roller when an end breaks. Capacitive or optical sensor incorporated in the yarn path record yarn faults enabling them to be cleared if limits are exceeded.



***Friction spinning*:-**

This process belongs to the open-end groups because the fibre strand must be opened completely to individual fibres and then reassembled to a new strand. The formation of new yarn is carried out by using suction to bring the individual fibres into engagement with the rotating open end of the yarn, e.g. by perforated drums. Binding of fibres and imparting strength are effected by continual rotation of the yarn in the converging region of two drums. The rotation of the yarn arises from the rotary movement of the two drums and is generated by frictional contact at the drums surface. Yarn formed in the convergent region by collecting fibres and binding them is must the constantly withdrawn and wound to a cross wound package.

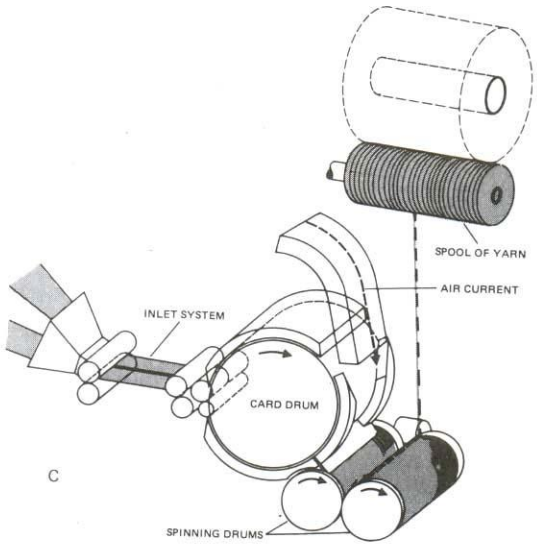
The operations to be carried out in this spinning process are given below:

i. Opening of the fibre strand
ii. Collecting the fibres into a new strand.
iii. Imparting strength by twisting.
iv. Withdrawing the resulting yarn.
v. Winding to a cross wound package.

One or more carded sliver are passed to the main opening roller i.e. drum clothed with saw teeth. While drafting arrangement creates only a light drafting effect, the saw teeth roller opens the strand to individual fibres. The fibres separated in this way are lifted off the roller by a blower and form a cloud, descending towards two perforated drums. One suction stream per drum draws the fibre into the convergent region between the drums. The open end yarn projects

into the zone and is also sucked towards the perforated drums. Since these rotate, the yarn also rotates in the convergent region. The newly arriving fibres contact the rotating yarn and are

thereby caught and twisted in. It is only necessary to withdraw the yarn continuously to twist fibres newly arriving in the convergent region into a yarn.



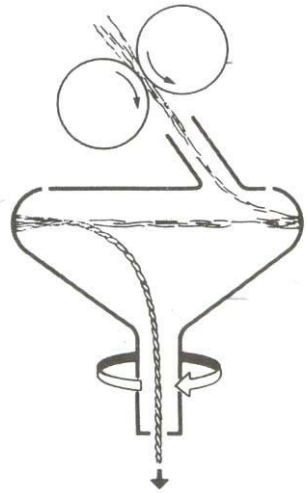
Electrostatic spinning:

Each bale of cotton may have as much as 8 to 12% very short fibre, and that a reduction in short fibre content will result in an increase in yarns strength and a substantial improvement in spinning efficiency, researchers tried to develop a system that would improve uniformity, strength and appearance of cotton yarn. Ultimately, research showed that under carefully controlled conditions of humidity, it is possible to separate short fibres from long ones in an electrostatic field.

The technique utilizes a non-uniform electrostatic field in which the gradient between the electrodes varies at a curved rate from minimum to maximum intensity. A mechanism was developed to remove the short fibres from the long fibres as they passed through the electrostatic field and transport the desired long fibres by an air current. Thus, from the carded stage, the fibres are drawn out, or drafted by rollers and are fed over rotating cylindrical electrodes of high field intensity which direct the long fibres to either an air current or an electrostatic field for transport to the combed sliver stage. The short fibre, which moves more slowly, are carried by rotating electrodes of low field intensity to where they are removed to a receptacle.

This electrostatic technique has been examined by some mill equipments manufacturers. One of the leading manufacturers has developed a commercial prototype

designed to meet the initial objectives of lower cost of production, greater efficiency and improved uniformity, strength and appearance of yarns.



3) Explain about classification of weaves?

A woven cloth is formed by the interlacement of two sets of threads, namely, warp and weft threads. These threads are interlaced with one another according to the type of weave or design. The warp threads are those that run longitudinally along the length of fabric and the weft threads are those that run transversely across the fabric. For the sake of convenience the warp threads are termed as ends and the weft as picks or fillings.

The ***plain weave*** is variously known as" Calico" or "tabby" weave. It is the simplest of all weave having a repeat size of 2. Range of application is wide.

The plain weave has the following characteristics:

i. It has maximum number of binding points

ii. The threads interlace on alternate order of 1 up and 1 down.

iii. The thread density is limited.

iv. Cloth thickness and mass per unit area are limited.

v. It

	X		X

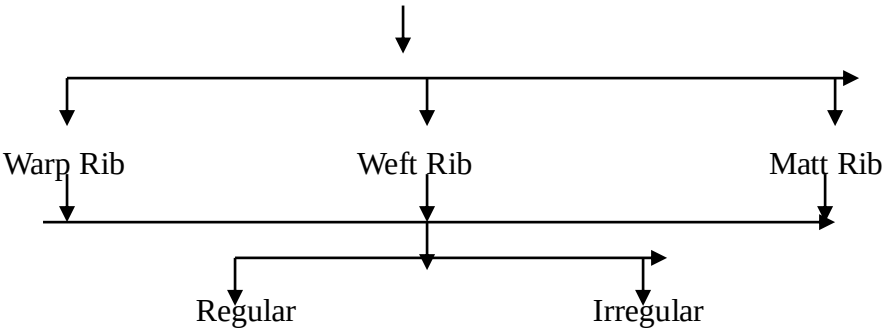
produces a relatively stronger fabric that is obtained by any other simple combination of threads, excepting that of " gauze" or "Cross Weaving"

Ex 1 up 1 down

X		X	
	X		X
X		X	

MODIFICATION OF PLAIN WEAVE:

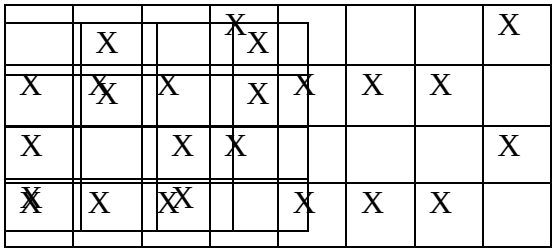
The plain weave may be modified as follows



Warp Rib Weaves:

These are produced by extending the plain weave in warp direction.

Eg:-2up2 down.



Weft Rib Weaves:

These are produced by extending the plain weave in weft direction.

eg: 3 up 1 down

Uses:

Rib weaves are used in grain cloths, repp cloth which is extensively employed for window blinds in railway carriages and other vehicle, handkerchief etc.,

Matt Rib Weaves:

These weaves are produced as result of extending the weave in both warp and weft direction.

Eg:-2 up 2 down matt rib

Uses:

Matt weave finds extensive uses for a great variety of fabrics such as dress material, shirting's, duck cloth etc.,

Twill Weaves:

Twill weaves are the weaves that find a wide range of application. They can be constructed in a variety of ways. The main feature of these weaves that distinguish from other types is the presence of pronounced diagonal lines that run along the width of the fabric.

The basic characteristics of twill weave are

i. They formed diagonal lines from one selvage to another
ii. More ends per unit area and picks per unit area than plain cloth.
iii. Less binding points than plain cloth.
iv. Better cover than plain weave.
v. More cloth thickness and mass per unit area

Classification of Twill Weaves:

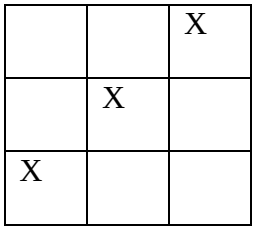
The classification of twill weave is as follows:

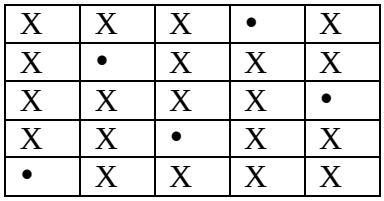
i. Ordinary or continuous twills.
ii. Zig zag, pointed or wavy twills.
iii. Rearranged twills such as satin/sateen weaves and corkscrew weaves.
iv. Combination twills
v. Broken twills
vi. Figured and other related twill weave

The above types of twill are further classified as:

		X	X
	X	X	
X	X		
X			X

i. Warp face twills
ii. Weft face twills
iii. Warp and Weft face twills

Warp face  ***twill:*** **2 up 2 down**

Weft face twill  ***1/2***

Satin weave & sateen weave:

Satin is a warp faced rearranged twills and sateen is a rearranged weft face twill. Thus satin is the reverse side of sateen weave**.**

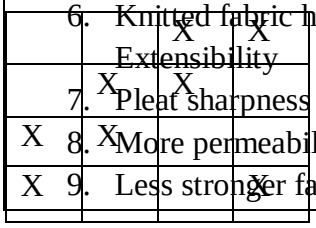
Eg:- Satin:- 5x5, move number = 2

Uses:

They find a wide range application such as denim, interlining cloth, dress material, children's dress material etc.,

4) Explain in detail- comparison between woven fabric and knitted fabric?

Knitted fabric	**Woven fabric**
1. Generally coarser count is used.	1. All types of count can be used.
2. Moisture absorbency is more	2. Moisture absorbency will be less
3. Crease resistance is high	3. Crease resistance is less
4. Fabric is thicker	
5. No wrinkles formed. Ironing not Required	4. Fabric is thin
6. Knitted fabric has good Extensibility	5. Require ironing
7. Pleat sharpness is less.	6. Extensibility is less
8. More permeability to air .	
9. Less stronger fabric.	7. Pleat sharpness is high



10. Any small defect occur in fabric it leads to more damage in cloth because it cannot be mended easily	8. Somewhat less permeability to air 9. Generally stronger fabric 10. No such problems

5) Discuss about the classification of non-woven fabrics?

Non wovens are defined by the American society for Testing and Materials as fabrics constructed of fibers held together "*by bonding or the interlocking of fibers or both, accomplished by mechanical, chemical* thermal, *or solvent means, and the combination thereof".* The fibers and processed through a series of opening, conditioning, and blending operations. Layers of webs of fibers are then formed. Adhesion of the fibres is accomplished by fibre friction, heat, the addition of an appropriate resin, latex, or other bonding agent.

Parallel-laid web, Cross-laid web, Random-laid web, High-velocity sprayed web, Air-laid web, Wet-lay web. In bonding the web resin bonding, latex foam bonding, gelatin bonding, thermoplastic bonding, spun bonding, spunlaced bonding, autogenic bonding, radiation bonding, composite bonding, stitch-through bonding

Characteristics of non-woven fabrics

The particular set of properties that a non-woven fabric may have is depending upon the combination of factors in its production. The range of characteristics is wide. The appearance of non-woven fabrics may be paper like, felt like, or similar to that of woven fabrics. They may have a soft, resilient, hard or stiff or broadly with little pliability. They may be like a tissue paper or many times thicker. They may be transparent or opaque. Their porosity may range from high, free air flow to minute impermeable.

Uses of Non-woven fabric:

There are two types of non-woven

- Durable non-woven have wide application. They are used for draperies, upholstery, carpet, insulation, etc.
- Disposable non-woven are used for one time use. Some of them are diapers, sanitary napkin, surgical and industrial masks, etc.