

ICT TRAINING MATERIAL

“FOR SLOW LEARNERS”

PREVIOUS YEAR UNIVERSITY QUESTION &

ANSWER FOR THE SUBJECT

“WET PROCESSING “

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WET PROCESSING

Part - A

Answer the following questions:

1. List out the properties of direct Dyes?

The properties of Direct Dyes are:

- ❖ Direct dyes are readily soluble in water.
- ❖ Some of the dyed need a little amount of soda ash (sodium carbonate) to completely dissolve them in water.
- ❖ Direct dyes are used for dyeing cotton, viscose rayon, wool and silk fibres.
- ❖ Direct dyes have poor wash in fastness and poor light fastness.
- ❖ Their fastness properties can be improved by certain after treatments.

2. What are the types of calendaring?

There are seven types of calendaring. They are

- a. 7 – Bowl calender
- b. Swizzing calender.
- c. Chasing calender
- d. Transfer calender
- e. Friction calender
- f. Schreiner calendar (and)
- g. Fett calendar.

3. What is meant by shrinkage?

Shrinkage is the contraction in the dimension of the fabric due to usage. Cotton fabric suffers from 2 main disadvantages of creasing and shrinkage during subsequent washing. Creasing is overcome by the Resin finishing whereas the shrinkage is prevented by a special finishing known as sanforising and the machine used for that purpose is known as sanforising and the machine used for that purpose is known as zero- zero pre shrinkage machine.

4. What is meant by water proofing?

Water proofing:

Water proofing is nothing but preventing the passage of both air and water through a fabric".

5.What is meant by continuos Desizing?

Continues Desizing:

Normally when matt extract is used as a desizing agent. It takes about 3-4 hours for complete desizing. But if use increase the concentration of the malt extract the time will be reduced to 5 minutes.

6.What is Mercerisation?

Mercerisation:

Mercerisation improves the luster of cotton fibres. It also gives the cotton material a greater affinity for colouring matters. Tension during mercerization is essential for to improve the luster. Mercerisation produces a permanent change in the structure of cotton fibre. Mercerization is a process in which the cotton material is treated with 25% to 30% (50oC to 65oC Tw) Na OH solution and under tension at room temperature.

7.What is Napping?

Napping:

Napping is chiefly used to obtain a relatively deep hairy surface, but the degree of depth depends upon the technique used. On the other hand, napping may also serve to cover up a sleazy construction and weaving imperfections.

8. What are different styles of printing?

Styles of printing:

The different styles of printing are:

- ❖ direct style
- ❖ discharge style (and)
- ❖ resist style

9. What are the Dye molecules?

The Dye molecules:

Dye molecules are organic molecules which can be classified as:

Anionic

Cationic (and)

Disperse

Anionic:

In which the colour is caused by the anionic part of the dye molecule.

Cationic:

In which the colour is caused by the cationic part of the dye molecule.

Disperse:

In which the colour is caused by the whole molecule. The first two dye molecules types are applied from an aqueous solution. The third is applied from an aqueous dispersion.

10. What is finishing?

Finishing is one of the essential processes of a processing mill where all bleached, dyed and printed material are subjected before they are put on the market. The aim of the textile finishing is to render textile goods fit for their end uses.

PART-B

Answer the following questions:

11.a) Write short notes about Scouring ?

Scouring

After desizing and thorough washing the cloth contains oils, fats, waxes, seed bits, leaf particles, and natural colouring matter etc. These oils, fats, waxes are hydrophobic or water-hating characters. So if these compounds present in the cloth, they affect the absorbency of

the cloth. These leads to imoproper dyeing , printing,and printing subsequent process.scouring is carried out in a boilers called as kier

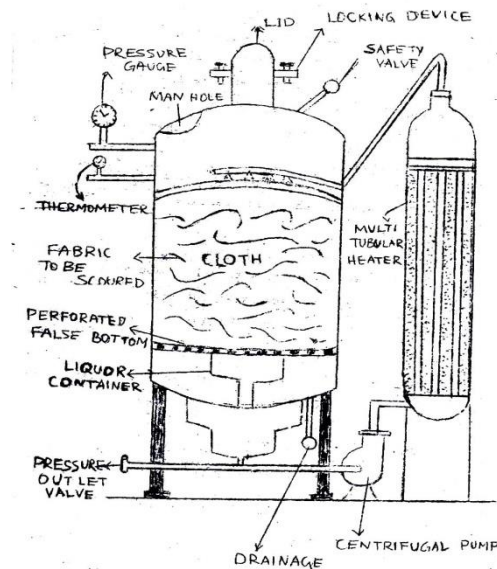
Two types of kiers are.

Horizontal kier

Vertical kier.

Vertical kiers

Scouring process is carried out commonly in vertical kier boilers usually underhigh pressure 20 – 30 lbs/sq. inch and temperature 120o-130o with 8 to 24 hrs , depend upon the type of fabric.



High pressure , high temperature vertical kier:

The vertical kier as shown in the figure . the kiers consists of a cylindrical vessel made up of a cast iron . The inner portion is coated with a lime wash to prevent the formation of rust stains on the fabric.

The desized fabric is placed inside the kier uniformly by manually or mechanically . It is called as packing or pilling Pacing should be done evenly . uneven packing result in uneven scouring.

The top of the kier is provided with cover known as lid. Usually boiling is carried out with 3% NAOH.

A required amount of sodium hydroxide is dissolved in water. This liquor is filled in liquor container. From the liquor container. The liquor is pumped with the help of centrifugal pump.

Then the liquor reach the heater, at that time the solution is heated and the heated solution is passed through the sprayer.

The sprayer is placed above the fabric. The heated solution is sprayed on the fabric and then reaches the liquor container with the help of perforated false bottom. This operation is repeated for 8 hours.

After the time is over the pressure is released. The liquor is taken out through drainage.

The cloth is washed with hot and cold washes two or three times and then the cloth is taken out for further process.

Caustic Soda boiling is used for Fine counts, super Fine counts varieties and delicate fabric structured material etc.,

Scouring liqueur is prepared as follows:

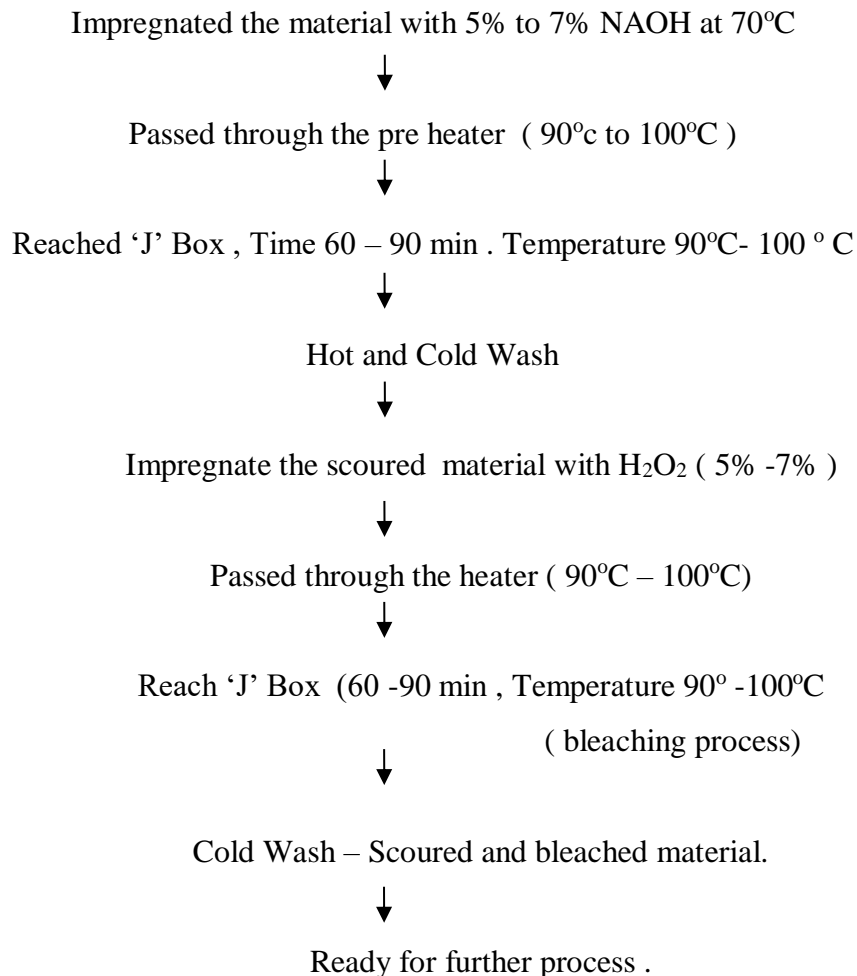
NaCh	--	3.0%
Soap	--	0.5%
Wetting agent	--	0.5%
(Turkey Red Oil)		
Sodium silicate--		1.0% (to retain heat stability)
Material to liquor ratic--		1:4
Temperature	--	120oC to 130oC
Time	--	8 hours
Pressure	--	20 to 30 lbs/sq.inch

Precautions:

1. When the scouring operation is started, remove the air completely inside the kier, changes of formation of oxy cellulose. It will damage the fabric.
2. Packing should be done uniformly. Uneven packing results in uneven scouring.
3. After packing the top portion is converted with heavy stones or thickly variety of fabric to prevent hot liquor directly falling on the fabric.

4. After scouring is over , washing is also done inside the kier , otherwise oxy cellulose will degrade the cotton material.

11.b) Explain detail about “J Box Bleaching” ?



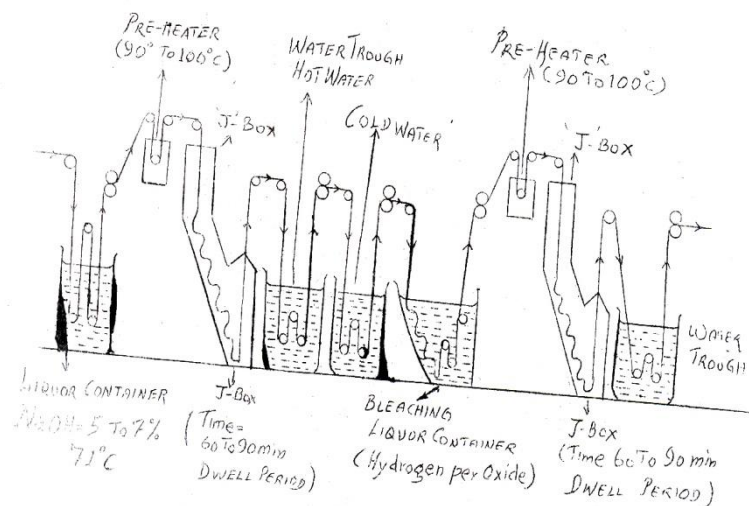
The cloth is now in a perfectly white condition .normal recipe used peroxide bleaching is as follows .

Hydrogen Peroxide	-	5% -7% (Weight of the fabric)
Sodium Silicate	-	3% (Weight of the fabric)
NAOH	-	0.4 % - 6.0 % (Weight of the fabric)
Soda ash	-	0.8% -11.0 % (Weight of the fabric)
PH	-	10.3 -10.8
Temperature	-	900°C-100°C

A modern tendency of continuous bleaching process based on the principle of ‘J’Box . both scouring and bleached process is done in a single process .

First the cloth is impregnated with NAOH solution with the help of the guide roller kept at 71°C and then the cloth is passed through the pre heated chamber . The material is heated 90°C to 100°C

The hot material next passes through the 'J' Box . From 'J' box to water trough the time taken is 60 – 90 minutes , at that time scouring process will takes place , this period is called as dwell period . if 'J' Box is well insulated to retain heat and it is lined with stainless steel .



After the scouring is over the material passed through the water trough contains the hot water to give hot wash and then passed through the another water trough to give cold wash as shown in the figure . The scoured material is impregnated with Hydrogen Peroxide (H_2O_2) strength about 3% - 7% and passed through the second heater and the material is heated .

The hot material is now reaching the 'J' Box . The time taken is 60 – 90 minutes at that time bleaching operation is taking place . Finally the material is washed in water trough . Now we will get scoured and bleached material in single process.

Advantage :

1. It is very fast process than the other process .

2. Production is more
3. Both Scouring and bleaching are done in a single process.
4. It is very economical when longer length of fabric is to be bleached .

12a). **Write about the general theory of Dying? And explain the fastness – Properties of Dyes?**

The General theory of Dying:

Dying is the process of colouring textile material by immersing them in an aqueous solution of dye, called dye, liquor. Normally the dye liquor consists of dye, water and auxiliary.

The general theory of dyeing explains the inter action between dye, water and dye auxiliary. More specifically, it explains:-

- ❖ forces of repulsion which are developed between the dye molecules and water and
- ❖ forces of attraction which are developed between the dye molecules and fitness.

These forces are responsible for the dye molecules leaving the aqueous dye liquor and entering and attaching themselves to the polymers of the fibres.

FASTNESS – PROPERTIES OF DYES:

COMMON PROPERTIES REQUIRED OF A DYE:

- ❖ When a dye is present on a fabric, it is expected to have certain properties. When a dyed (or) printed fabric is exposed to sunlight during its use, the dye should not fade (or) change in colour. That is it should have high light fastness.
- ❖ The dye should possess good washing fastness. If the cloth dyed with it is used for making garment. Otherwise staining of garments with stripped dyestuffs occurs during the washing of many garments together.
- ❖ The dye should have good perspiration fastness when people wearing coloured garments perspire, a part of the dye coming into contact with the perspiration may be stripped and stain the skin of the water.
- ❖ Apart from these properties the dyes can be expected to have good fastness to gas fading incites gases like sulphur, nitrogen – dioxide, may be present in the atmosphere and the dye may be affected. Dye polyesters and polyamide fabrics are exposed to very high temperatures during processing -----textile mills. At this temperature some of the dyes

submit off. For this purpose, the dyes used on the fabric should have good sublimation fastness.

A dye need not have good fastness to all the agencies. A dye intended for dyeing (or) printing certain cloth need not be fast to perspiration but should have very good light fastness. Therefore, dyes have to be selected depending on the use of the fabric to which it is put.

12.b).Explain about dyeing of cotton with sulphur dye ?

The dyeing is carried out in the following four stages .

- 1. Dissolving**
- 2. Dyeing**
- 3. Oxidation**
- 4. After treatment.**

Dissolving :

In dissolving , the insoluble sulphur dye is converted into soluble leuco dye.

The dye is taken as per shade and pasted with small quantity of Tirkey Red Oil and cold water .



Soda ash (Na_2CO_3 -1/2 the quantity of dye) and sodium sulphide (Na_2S -1.5 times of dye) are added one by one and stirred. Boiling water is poured in and stirred . The solution is boiled for 5-10 minutes if necessary . Sodium sulphide reduces the dye into its leuco form . Soda ash neutralizes the acidity of the dye . The insoluble sulphur dye is converted into soluble sodium salt (Leuco Form). Original colour of the solution is changes into reduced colour .

Dyeing :

Fabric is loaded in the machine. The dye bath is set up as Per M:L ratio.Bath temperature is raised to 50oc. Circulation of liquor or material is started . The dye bath should have sufficient quality of sodium sulphide and soda ash . PH of the bath is10 -11.

↓ 5 min

The pre dissolved dye solution is added. Bath temperature is raised to 90oC - 100oC. The fabric should not expose in the atmosphere as the oxygen in the air may oxidize the dye and causes ‘ Patches ‘.

↓ 5 min

10 – 20 20 gpl Glauber salt or common salt is added in two instalments with a time of interval of 15 minutes . The dyeing is continued for further process 45 min – 60 min . Dye penetrates well into the fibre molecule .



The material is squeezed (It should not be washed)

Oxidation :

The leuco dye inside the fibre molecule is oxidized into its original insoluble form. The dye molecule is mechanically trapped inside the fibre molecule and hence it can not come out in subsequent washing . There are two types of oxidation namely

- I) Air oxidation
- II) Chemical oxidation

- In air oxidation , the material is exposed to atmospheric air for 15 min
- In chemical oxidation , the material is treated with 1-3 gpl sodium perborate or 2 gpl H₂O₂ with 1 gpl acetic acid .

After Treatment:

The fastness to light and washing of sulphur dyes is improved by after treatment with the following solution . It should never be done for sulphur black .

1.25% Potassium dichromate (K₂Cr₂O₇ – To improve wash fastness)

1.25% Acetic acid (60%)

1.25% copper sulphate (CuSO₄ – To improve the light fastness)

at 60oC for 30 min



Hot Soaping – 5gpl soap and ash at 80oC for 15 min



Cold wash for 15 min

Bronziness :

Bronzing of shade is nothing but an unwanted glittering patches on surface of fabric , most commonly occurring fault with sulphur blacks and blues which is caused by

1. Excessive delay in washing off the material after it is taken out from the dye bath .
2. Excess of dyestuff on the material or too much salt in the bath .

3. Insufficient sodium sulphide in the dye bath and due to its incomplete solution of the dye stuff which results in surface dyeing of the material where it is quickly oxidized by contact with the atmosphere

Bronziness can be removed by treating the dyed material in boiling soap or sodium sulphide solution.

Sulphur Black Tendering :

Sulphur black tenders and dyed material. It has been attributed to the presence of free sulphur, which gets converted into sulphuric acid on storage that degrades cotton by hydrolysis of cellulose. The sulphur black dyed material should not be treated with copper sulphate as it is tendered more rapidly. The danger of tendering on storage can be reduced by treating with potassium dichromate followed by washing with 8 gpl soda ash.

13a) Brief on Block Printing ?

Block printing is the oldest and the simplest method of printing. Because of its artistic and decorative value and the purity and richness of colour produced by it the method is still used in many countries of the world.

The blocks used in this method are made of several layers of common timber which are cemented together and the portions to be printed are carved or raised in relief on a thick block of wood. Metallic blocks such as 'T' japs are used for special work as in Batik Printing. In block printing 10 – 40 needles are used in this instrument. Colour in the form of a thickened paste is applied to the raised parts of the block and the impression of the design is obtained by stamping the block by hand with a wooden mallet and the cloth should be printed.

Each shade of a colour requires a separate block and in very large patterns, each individual colour may require more than one block. Thus in a design called "Dutch Boquet" which has 23 colours in it, 126 blocks are used for printing the designs.

Procedure :

The colour paste is spread on the woollen cloth of the sieve 'a'. The block is carefully placed on this sieve and pressed twice (or more) so that it picks up a uniform layer of paste, it picks up a uniform layer of paste, it is then stamped on to the cloth on the table by giving blows or striking it with a small but heavy mallet (or hammer) to ensure a clear impression.

A separate sieve 'a' is required for each colour but the same swimming tup can be used over and over again . By repeat stamping of the colour paste , the pattern is built up and process is repeated until all the colours are separately applied and the whole piece of cloth is printed . It is then removed , dried and given appropriate after treatment .

Advantage :

- a. The method is simple to operate and does not require elaborate and expensive equipment .
- b. Designs in any number of colours and on any scale can be reproduced with ease and certainly by this method .
- c. First – rate block prints possess richness , fullness and purity of colours

Disadvantage :

- a. The method is slow and therefore , has a low output and its cost is high .
- b. For printing block designs or designs with very long or wide repeats , it is not possible to use a large – sized block of great weight because the printer will not be able to manipulate properly such a block .
- c. The method involves manual work , it is therefore , quite laborious .

13. b) Write notes on Duplex Printing and Warp printing ?

Duplex Printing :

Duplex printing stimulates a woven pattern by printing the fabric on both sides . The fabric may be passed through the roller printing machine in two separate operations or through a duplex printing machine in a single operation or through a duplex printing machine in a single operation . Duplex printing produces an equally clear outline on both sides of the fabric . The designs is applied so skillfully by careful registration of the printing cylinders that the result may be mistaken for a woven designs . The difference can be detected by raveling a yarn .

Warp Printing:

Warp printing is roller printing applied to warp yarns before they are woven into fabric . fine white or neutral – colored filling yarns are generally used for weaving so that the designs on the warp will not be obscured . This methods produces designs with soft , nebulous , but striking effects . Great care must be taken to keep the warp yarns in their

proper position so the outline of the designs will be preserved , warp printing is used for expensive cretonnes are upholstery fabrics .

A variation of warp printing is vigoreux printing of mélange . Utilizing a variation of roller printing , horizontal or cross – striped designs are printed on the ropelike woll tops or slubbings . Subsequently when the tops are spun in to yarn , the stripes are attenuated and pulled apart so that they appear scattered flecks of color in the woven cloth.

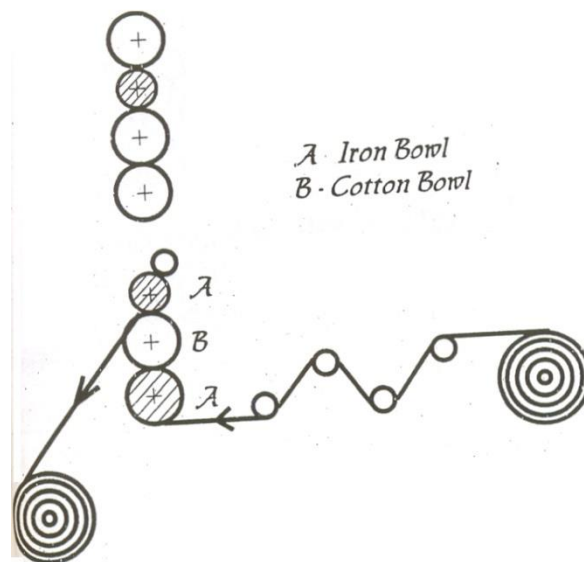
14 . a) Write Short Note on Friction Calender ?

Calendering :

Object:

- To upgrade the fabric handle and to impart a smooth silky touch to the fabrics.
- To compress the fabric and reduce its thickness
- To improve the opacity of the fabric
- To reduce the air permeability of the fabric by changing its porosity
- To impart different degree of Lustre to the fabric.
- To reduce the Yarn Slippage.

Friction Calender :



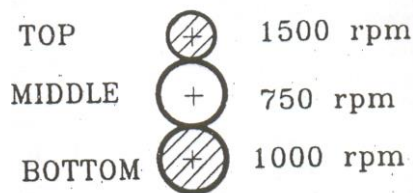
For producing this effect, the top four bowls of a 7 bowl calendar can be lifted up, disconnecting the contact between the third and the fourth bowls so as to use only three bowls.

The above diagram is a friction calendar with a 7 bowl calendar after disconnecting the top four bowls.

The three bowl calendar, one of which is cotton and the other two or of chilled iron.

Friction calendaring gives a higher Gloss and greater closing of the yarns, it is produced by bringing the cloth in contact with a heated polished chilled iron bowl is rotated at double the speed of the fabric and of the lower two bowls.

As the variation, the top bowl may be run at $1\frac{1}{2}$ times the speed of the lowest bowl, with the middle bowl running at an intermediate speed.



The top bowl with its higher surface speed produces the friction effect by polishing the cloth.

This finish is generally imparted to loose construction cloth such as binding cloth, low quality printed cloth etc.,.

It is generally run at a speed of 32 mts/min.

The speed of the calendar when used in friction calendaring is determined by the amount of finish desired on the fabric and by the number of bowls used.

14.b) write notes on Flame Retardant Finish for cotton ?

Theories and mechanism of flame Retardency :

1. Coating theory:

Flame retardance is due to formation of a layer of a fusible substance which melts and forms a coating thus excluding the air necessary for the propagation of flame. carbonates and ammonium salts liberates gases like CO_2 , NH_3 and exclude air.

2. Gas theory :

The flame retardant decomposes at burning temperature and develops non combustible gases which obstruct and dilute the combustible gases. Eg. Mixtures of titanium and antimony oxides.

3. Thermal theory :

Heat supplied from the source is conducted from the fibres very rapidly that the fabric never reaches the temperature of the combustion .

4. Chemical theory :

The flame retardants react with cellulose on burning and forms chemicals such as phosphoric and sulphuric acid which are dehydrating agents , these brings about catalytic dehydration of cellulose , which on combustion produces mainly carbon water .

Flame retardant finish for cotton:

First method:

By depositing insoluble metallic compounds , the effect of fire proofing obtained is permanent as it does not wash out .

Out of all Antimony Oxichloride is the best .

It is precipitated on the fibre by the double decomposition of tartaremetic and stannic Oxichloride and then washed in running water .

In the same manner . Metallic Salts such as Magnesium Borate , Ammonium Sulphate and Magnesium Silicate also produce fire proofing

Second Method :

Soluble Compounds such as Borax . Sodium Phosphate are used . A mixture as given below is found to be effective for this finish .

Borax - 50 Parts

Boric Acid - 35 Parts

Sodium Phosphate - 15 Parts

Only 5% Solution of the mixture is used .

Most of the fire proofing agents can be fixed by synthetic resins .

Most of the fire proofing agents can be fixed by synthetic resins.

Tetrakis Hydroxy Methyl Phosphonium Chloride (THPC) . when used with Urea and Methylol . Melamine produce good wet fastness flame proofing properties .

The fabric is padded through the solutiojn containing .

THPC - 15.8 %

Methylol melamine - 9.5%

Tri ethanol amine	-	3%
Urea	-	9.9%

Dried and cured at 140oC for 5 mins and washed . This process is known as ‘proban ‘ finishing .

Process Sequence :

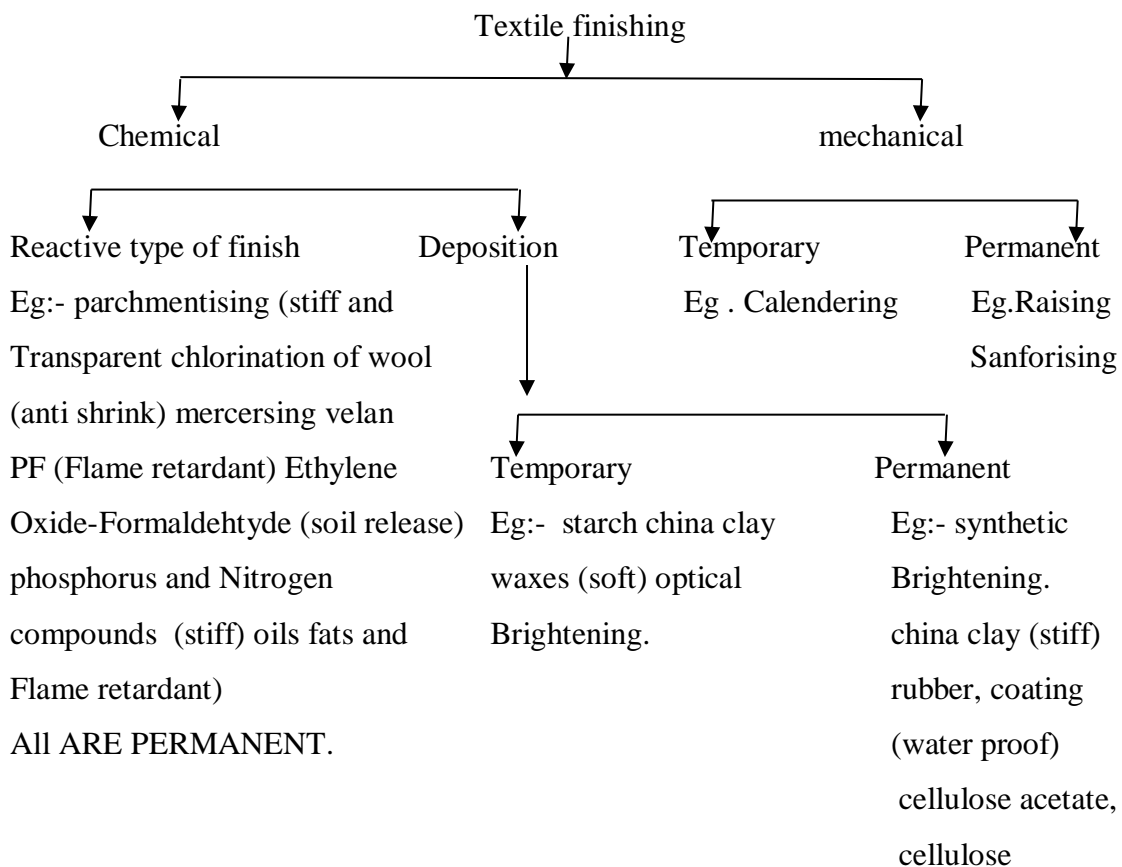
Pad – Dry – Cure

15 a). Classification of finishes? Explain types of finishing?

Finishing:

Finishing is one of the essential processes of a processing mill where all bleached, dyed and printed material are subjected before they are put on the market. The aim of the textile finishing is to render textile goods fit for their and uses

Classification of Finishes



Types of finish:

Finishing mainly falls into three groups:

Temporary finish.

Permanent finish (and)Semi – Permanent finish

Temporary finish:

A finish which is not stable and goes off after the first wash is known as “TEMPORARY FINISH”

If the finishing effect in the fabric disappears during subsequent washing and usage then it is called “TEMPORARY FINISH”

For example : Mechanical : Calendering, Embossing etc.,
Chemical : starching, softening (Except Reactive softness)

Permanent finish:

If the finishing effect in the fabric does not disappear and remains unaffected through all the conditions of wear and washing treatments, then the finish is said to be a “PERMANENT FINISH”.

For Example:

Mechanical : sanforising, mechanical mills of wool, etc.,
Chemical : Resin finishing, water proof, flame proof finish, etc.,

Semi – permanent finish:

A finishing on the fabric is said to be “SEMI PERMANENT FINISH” if it is stable to more than 5 to 10 washes and not afterwards.

For Example: Mechanical : schreiner Calendering
Chemical : Buckram finish

5.b) What is Decatising ? Explain with Diagram?

Decatising:

This is also a finish similar to felt calendaring mostly meant for woolenfabrics. But today all suitings are decatised.

Both batch and continuous methods are available:

- ❖ Essentially, this is a stress – Relaxation process.
- ❖ The function of setting is to relax the various

Stresses built up in the material during spinning and weaving to stabilize the fibres in the new and desired construction.

Wool fibre contains small quantity of Thiol groups (-SH). It can be converted into Disulphide bond (-S-S) by reaction of wool with a reducing agent or by the action of hot water, steam or alkalies.

This interchange reaction and hydrogen bond rearrangement are important in wool setting.

Mechanism:

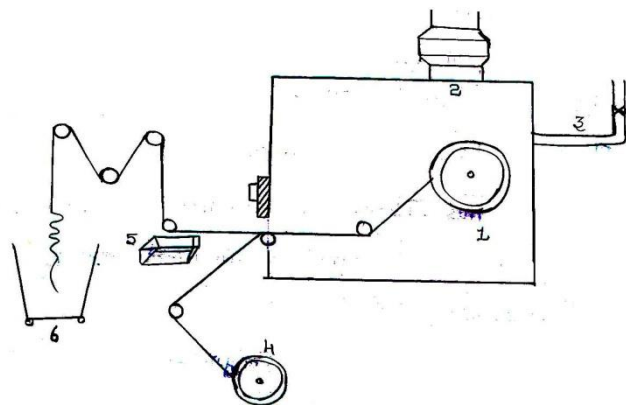
The fabric is compressed between two layers of woolen felt and steam is blown simultaneously. The fabric acquires body, suppleness with ironing effect on both the faces. These are due to the swelling of the fibre by steam.

Parameters:

The effectiveness of decatizing depends on

1. Type of fibre.
2. Time of contact
3. Amount of contact
4. Tension
5. Type of finish desired

DECATISING MACHINE



1. Steam Heated Cylinder
2. Exgast
3. Steam kube
4. woolen felt.
5. Table
6. Finished Material

process:

Without the fabric felt is run forward and backward for 15-30 minutes. The fabric is fed along with the woolen felt. The amount of fabric to be fed depends on the length of the woolen blanket.

Normally one piece is fed. The piece is cut at the joint. The chamber door is shut and the steam is opened and maintained at a pressure of 10- 15 PSI. the felt is run forward and backward with the help of reversible motor for 5 minutes.

After the treatment time, (Normally 7 minutes) steam is shut off and the fabric is collected and laid on the table.

Chemical Decatising:

It will give a full soft feel.

Normally sodium Bisulphide is used at a concentration of 10-20 gpl.

Pad – Dry – Steam

Padding is done at an expression of 50% on a padding mangle.

Steaming is done by winding the material on a perforated beam of a decatising machine and steamed for 3-5 minutes followed by the application of vacuum till the fabric cools.