# Material and Methods of Construction

**Lecture # 4 Timber, Paints, Varnish, Lacquers and Distemper**

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## 6.14 Timber

It is the wood suitable for building or engineering purposes and it is applied to trees measuring not less than 0.6 m in girth. The cross-section of an exogenous tree is shown in Fig. 6.1. The important parts are as follows :

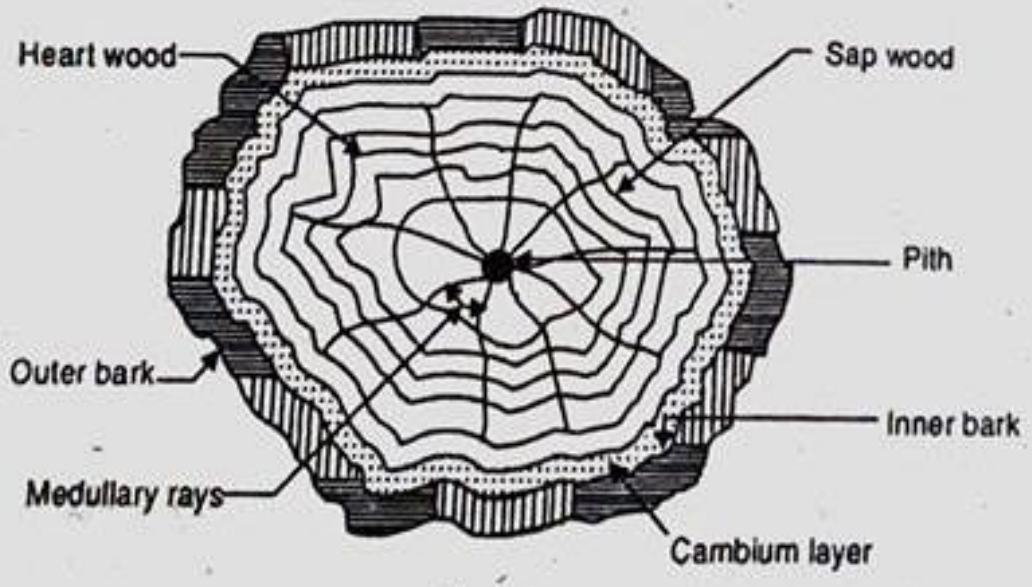


Fig. 6.1

(*a*) *Pith.* It is the inner most central portion or core of the tree.

(*b*) *Annular rings.* These are the concentric circles or rings of woody fibre around the pith.

(*c*) *Heart wood.* It consists of the inner annular rings around the pith.

(*d*) *Sapwood.* It consists of the outer annular rings between the heart wood and cambium layer.

(*e*) *Cambium layer.* It is a thin layer just below the bark and not converted to sap wood yet.

(*f*) *Medullary rays.* These are thin radial fibres extending from the pith to cambium layer.

(*g*) *Inner bark.* It is the inner skin or layer covering the cambium layer.

# Timber Seasoning



(*h*) *Outer bark*. It is the outermost cover or skin of stem.

## 6.15 Seasoning of Timber

The process of drying timber or removing moisture or sap, present in a freshly felled tree, is called *seasoning of timber*. The following two methods are commonly used for seasoning of timber.

1. *Natural seasoning or Air seasoning*. This method of seasoning the wood is simple and cheap, but it is very slow. It requires about 60 to 90 days for soft wood.

2. *Artificial seasoning or Kiln seasoning*. It is the quickest method of wood seasoning and keeps the moisture contents under control. The seasoning by this method, generally, takes four to five days under normal conditions.

# Defects in Timber

## 6.16 Defects in Timber

The following are the most common defects in timber :

1. *Heart shake.* This defect usually occurs in over matured trees and is caused due to shrinkage of the heartwood.

2. *Star shake.* This defect is mostly caused by severe frost or by severe heat of the sun. It is mostly confined to sap wood.

3. *Cup shake or Ring shake.* This defect is caused by strong winds which sway the tree or due to excessive frost which affects the moisture present in the tree when it is still young

# Defects in Timber

present in the tree when it is still young.

4. *Knot.* This defect is caused by the roots of small branches of the tree which as embedded in the stem with the formation of circular rings at right angles to those of the stem. The knot may be *live knot* or *dead knot.*

5. *Foxiness.* This defect is caused due to over maturity and unventilated storage of the wood during its transit.

6. *Honey combing.* This defect is caused during seasoning of timber.

7. *Dry rot.* This defect is caused by fungus.

8. *Wet rot.* This defect is caused by alternating drying and wetting of the timber.

# Paints

## 6.17 Paints

The paints are coatings of fluid materials applied over the surfaces of timber and metals as protective coatings and to improve their appearance. The paint commonly used for engineering purposes is an oil paint. It is a fluid paste prepared by dissolving a base into a vehicle along with a colouring pigment. The bases used in oil paints are white lead, zinc white, red lead, iron oxide, titanium white and lithophone (a mixture of zinc sulphide and borytes). The base in oil paint is added to hide the surface to be painted. The vehicles used are linseed oil, poppy oil, nut oil, tung oil etc. It acts as a binder for the base and the pigment. The colouring pigments include black, blue, brown etc. The other ingredients of an oil paint are solvent or thinner, drier and inert filler. The solvent or thinner (turpentine oil, naptha petroleum spirit etc.) is added to the paint to modify the consistency of the paint, to make its application easy and smooth. The drier (litharge, lead acetate, manganese sulphate etc.) enables the paint to dry quickly. The inert filler (powdered chalk, charcoal, silica, gypsum etc.) are used to make the paint economical and of desired quality.

# Paints

The different types of paints are oil paint, aluminium paint, bronze paint, asbestos paint, cellulose paint, cement paint, enamel paint, emulsion paint, silicate paint, casein paint, plastic paint and synthetic rubber paint.

# Varnish

## 6.18 Varnishes

The varnish is a homogeneous mixture of natural or synthetic resin in a particular solvent. The commonly used resins are copal, amber, lac or shellac, dammer etc. and the solvents are linseed oil, turpentine oil, methylated spirit or alcohol. A drier (litharge) is also added to help in quick drying of varnish. The varnishes are of the following two types :

(*a*) Oil varnishes, and (*b*) Spirit varnishes.

The *oil varnish* is a homogeneous solution of one or more resins in a drying oil (linseed oil) and a volatile solvent (turpentine oil) and drier.

The *spirit varnish* is obtained by dissolving the resin (lac or shellac) in a volatile solvent (methylated spirit).

# Lacquers and Distemper

## 6.19 Lacquers

A lacquer is a solution made by dissolving nitrocellulose, resin and plasticizer in a solvent with or without the colouring pigments. In a lacquer, nitrocellulose provides toughness and resistance to abrasion. The resins (such as alkyd, copal, dammer, ester, gum etc.) increase adhesion and hardness. The plasticizer (castor oil) is added to improve elasticity and plasticity. The solvent is usually a mixture of ketone, alcohol and a hydrocarbon.

## 6.20 Distempers

The distemper is made by mixing a dry pigment (chalk or whiting) with clean water and ordinary size. It is used on plastered surfaces not exposed to weather.