

(Engr. Jauera Tanuor)

Mesine low heat Cement
Concrete
Structure
TPSC

Di Calcium silicate

MCO2

specific gravity of the Mortar of the building Stones = 2.5 to 3

6

Building Materials

(MCO2) Hardest Rock → Diamond

Softest = Talc

6.1 Introduction

The building materials include stones, bricks, lime, cement, concrete, mortar and timber. These materials are discussed, in brief, as follows:

6.2 Stones

heavy stones are suitable for Retaining Wall

The stones are derived from rocks which form the earth's crust and have no definite shape or chemical composition but are mixtures of two or more minerals. The rocks from which stones are obtained may be classified in the following three groups:

1. Geological classification. Geologically, the rocks are classified into three types as follows:

(a) Igneous rocks. The igneous rocks are formed due to the solidification of molten mass laying below or above the earth surface. It has a crystalline glossy or fused texture.

(b) Sedimentary rocks. The sedimentary rocks are formed due to gradual deposition of materials like sand, clay etc., generally by setting water. These are also called stratified because these rocks are formed in layers. Limestone and sandstone belong to this category of rocks.

(c) Metamorphic rocks. The metamorphic rocks are formed due to alteration of original structure under heat and excessive pressure. Marble is an example of metamorphic rock.

2. Physical classification. Physically, the rocks are classified as follows:

(a) Stratified rocks. The stratified rocks are those which exhibit distinct layers which can be separated. The limestone, slate and sandstone are examples of stratified rocks.

(b) Unstratified rocks. The unstratified rocks are those which do not show any sign of strata and cannot be easily split into slabs. The granite and marble are examples of unstratified rocks.

3. Chemical classification. Chemically, the rocks are classified as follows:

(a) Silicious rocks. The silicious rocks are those which contain silica as the main constituent. The granite, quartzite, gneiss are examples of silicious rocks.

(b) Argillaceous rocks. The argillaceous rocks are those which contain clay or alumina as the main constituent. The slate, laterite, Kaoline are the examples of argillaceous rocks.

(c) Calcareous rocks. The calcareous rocks are those which contain lime or calcium carbonate as the main constituent. The limestone and marble are the examples of calcareous rocks.

6.3 Important Building Stones

→ Intrusive, Plutonic Rock

Mineral

mineral

The following are important building stones, their composition, properties and uses:

1. Granite. It is an igneous rock. It is mainly composed of quartz, feldspar and mica. Its specific gravity is 2.64 and compressive strength varies from 70 to 130 MN/m². Its colour depends upon that of feldspar which may be brown, grey, green and pink. A fine grained granite offers high resistance to weathering. It can be easily polished and worked. It is used for exterior facing of buildings.

(piers & Abutment)

Stone for Rubble Masonry = hard

* Feldspar is a silicate of aluminium with varying amounts of potash, soda or lime.

MCO2 → cross cut saw = cutting hard stones

Jumper → quarrying of stones
Water Absorption of Stone = 5%

(Engr. Jaunera Tanweer)

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245
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Water Absorption of Stone $\Rightarrow$ 5%

Roof

2. Slate. It is an argillaceous rock. It is mainly composed of alumina mixed with sand and carbonate of lime. Its specific gravity is 2.8 and compressive strength varies from 60 to 70 MN/m². It has grey or dark blue colour. A good slate is hard, tough and fine grained. It is suitable for use in cisterns. The slate in the form of tiles is used as an excellent roof covering material. MCQ2

Polymetamorphic 3. Gneiss. It is a silicious rock. It is mainly composed of quartz and felspar. It is more easily worked than granite. It is a good material for street paving. Mineral → Strength

Sedimentary 4. Sandstone. It is a sedimentary rock of silicious variety. It is mainly composed of quartz, lime and silica. Its specific gravity is 2.65 to 2.95 and compressive strength varies from 35 to 40 MN/m². Its usual colours are white, grey, brown, pink etc. The fine grained stones are strong and durable. It is suitable for ashlar work, mouldings, carvings etc. Compact Sandstone → Weather Resistant

Sandstone 5. Limestone. It is a sedimentary rock of calcareous variety. Its specific gravity is 2.6. It is available in brown, yellow and dark grey colours. It is used in large quantities in blast furnaces. It may be used as stone masonry for walls.

Quartzite 6. Marble. It is a metamorphic rock of calcareous variety. Its specific gravity is 2.7 and it is available in many colours. It is very hard and takes a fine polish. It is used for carving and decoration work. Impure limestone MCQ2

Siliceous Rock 7. Kankar. It is an impure limestone containing 30% of alumina and silica. The hard kankar is used for foundations of buildings.

Weather Resistant 8. Laterite. It is a sandy claystone containing high percentage of iron oxide. It has a porous and cellular structure. Its specific gravity varies from 2 to 2.2. The laterite blocks are suitable as building stones whereas nodular laterite proves a very good road metal.

9. Moorum. It is a decomposed laterite and has deep brown or red colour. It is used in surfacing fancy paths and garden walks. MCQ2

10. Quartzite. It is a silicious sandstone which has been subjected to metamorphic action. It is strong and durable. It is used as a road metal or railway ballast or in concrete. MCQ2

6.4 Bricks Unsoiling = 20cm layer and then digging 60 to 120cm MCQ2

The brick is the most commonly used building material and used for constructing walls, columns, roofs, paving floors etc. A good brick clay contains 20 to 30 percent of alumina, 50 to 60 percent of silica and the remaining constituents are lime, magnesia, sodium, potassium, manganese and iron oxide. It may be noted that Impart plasticity MCQ2 Brick shape = Silica

- Important part paper
1. The excess of alumina in the clay makes the brick crack and warp on drying.
 2. The excess of silica in the clay makes the brick brittle and weak. Strength
 3. The excess of lime in the clay causes the bricks to melt and distort during burning. Reduce Melting
 4. The alkaline salt present in the bricks, absorb moisture from air which on drying leaves powder deposit on the brick. This effect is known as efflorescence. It is also caused if the clay used for making bricks contain pyrite and the water used for pugging the clay contain gypsum.

6.5 Manufacture of Bricks 10% → Slight, 10-30% → Moderate MCQ2
75 heavy

The manufacture of bricks consist of the following four major operations :

1. Preparation of brick clay. First of all, the earth is dug out in clear weather and cleaned off stones, pebbles, grits, vegetable matter etc. The earth after digging out is left to atmospheric action for few weeks. This process is known as weathering. It is found that 1.5 to 2.5 cum of earth is required for moulding 1000 bricks. The clay is then tempered in pug-mills MCQ2 - a pug mill

Note : The process of mixing clay, water and other ingredients to make bricks is known as kneading.

2. Moulding bricks. After preparing the clay, the moulding of bricks is carried out either by hand or by machine. In hand moulding, the bricks are moulded by hand i.e. manually. It is preferred where manpower is cheap and readily available. The hand moulding may be done either on ground or

Heavy duty Brick
No efflorescence

Mix
Mould Size $\rightarrow$ 8-12% higher, Moisture Reduce 2%.

on table and accordingly these are termed as ground moulding or table moulding.

The bricks are moulded in machine, when large number of bricks are to be manufactured in a short time. The machine moulding may be performed either by plastic method or dry process method.
Note: The hand made bricks are superior to machine made bricks for facing purposes. *Strength $\rightarrow$ 15-25 kg/cm²*

3. Drying of bricks. After the bricks are moulded, they are dried. The drying of bricks may be natural or artificial. In natural drying, the moulded bricks are kept in the sun for a day or two so that they become sufficiently hard to be handled safely. These bricks are now arranged in rows on their edges on a slightly raised ground called hacks. A little space for free circulation of air is kept for each brick. The air and sun dried bricks are adequately strong and durable. If the bricks are not properly dried before they are burnt, they may get cracked and distorted during the burning process.

The artificial drying is used when bricks are required on a large scale and at a rapid rate.

4. Burning of bricks. The burning of dry bricks is done either in a clamp or in a kiln. In India, both clamp and kiln burning are practised. It may be noted that the average out-turn of first class bricks in clamp burning is about 60% whereas for kiln burning it is about 80 to 90%.

Notes: 1. The burning of bricks in kilns is complete within 24 hours.

2. The bricks should be burnt at a temperature from 1000°C to 1200°C.

3. The bricks after burning in kilns require about 12 days to cool down for unloading. $\rightarrow$

6.6 Classification of Bricks

The bricks are classified as under:

1. First class bricks. These bricks are well burnt having smooth and even surface with perfect rectangular shape and uniform reddish colour. These bricks should not absorb water more than 20 percent of its own dry weight after 24 hours immersion in water. It should have a minimum crushing strength of 10.5 MN/m². *MCQ2*

2. Second class bricks. These bricks are slightly over burnt having rough surface and not perfectly rectangular in shape. These bricks should not absorb water more than 22 percent of its own dry weight after 24 hours immersion in water. *MCQ2*

3. Third class bricks. These bricks are not properly burnt (under burnt) in the kiln and hence these are soft and can be easily broken. These bricks should not absorb water more than 25 percent of its own dry weight after 24 hours immersion in water. *MCQ2*

4. Waste bricks. These bricks are over burnt with irregular shape. These bricks are dark bluish in colour. *MCQ2*

Notes: 1. The standard size of bricks are 19 cm $\times$ 9 cm $\times$ 4 cm or 19 cm $\times$ 9 cm $\times$ 9 cm. *MCQ2* Frog Size 10x4x4 cm

2. The specific gravity of bricks is about 2.

3. The number of bricks required for one cubic metre of brick masonry are 550. *500 MCQ2*

6.7 Special Bricks

The special bricks differ from the commonly used building bricks with respect to their shape, specifications and special purpose for which they are made. Following are some of the special bricks: *MCQ2*

1. Squint bricks. These bricks are used in construction of acute and obtuse squint quoins. *MCQ2*

2. Paving bricks. These bricks are extensively used for street pavements, stable floors, garden walls etc.

3. Round bricks. These bricks are used for circular pillars.

4. Perforated and Hollow bricks. These bricks are used for partition walls or panel walls in multi-storeyed buildings. *RCC bricks Sound Insulation / heat Insulation*

5. Refractory bricks. A good refractory brick should have the capability of withstanding high temperature and low coefficient of expansion and contraction. Following are the three types of

Blatt & Fungue
 $\therefore$ Bull Note Brick is not used for Arch Brick
Used as drains $\rightarrow$ Channel Brick

Header bond - Base Arches.

Sketches: half brick wall.

refractory bricks :

- (a) Acid bricks (Fire bricks and silica bricks),
- (b) Basic bricks (Magnesite bricks, dolomite bricks and bauxite bricks), and
- (c) Neutral bricks (Chrome bricks, chrome-magnesite bricks and spinel bricks).

6.8 Building Tiles

The building tiles are thin slabs of brick clay, burnt in kiln. The various types of tiles are flooring tiles, roofing tiles (i.e. pot tiles, *pan tiles and flat tiles), wall tiles, drain tiles and glazed earthenware tiles.

6.9 Lime *Normal curing period for lime Mortar → 7 days*

The lime is calcium oxide (CaO) obtained by calcination of limestone (white chalk), kankar and other calcareous substances. It is not found in nature in the free state.

It is used as a matrix for concrete, for plastering walls, ceiling etc, for improving soil for agricultural purposes and in the production of glass. It is also used as a flux in the manufacture of steel, and in the manufacture of paints.

6.10 Types of Lime *The property by which lime sets under water (= hydraulic)*

The lime is available in the following types:

1. **Quick lime.** It is the lime obtained after the calcination of pure limestone. It is amorphous and highly caustic having no affinity for carbonic acid. *MCQ2*

2. **Slaked lime or hydrated lime.** It is the lime formed by the absorption of water by quick lime. The process of chemical combination of quick lime with required quantity of water is known as *slaking*. *MCQ2*

3. **Fat or rich lime.** It is the lime which has high calcium oxide (about 95%) content and can set and become hard only in the presence of carbon dioxide from atmosphere. This type of lime is perfectly white in colour. It has high plasticity. *(Tufa → pure lime stone)* It slakes rapidly with considerable evolution of heat and its volume increases two to three times of its original volume during slaking. It takes very long time to develop adequate strength. It is commonly used for white washing and plastering walls. *MCQ2*

4. **Hydraulic lime.** It is the lime which has small quantities of silica, alumina and iron oxide, which are in chemical combination with calcium oxide. It can set and become hard even in the absence of carbon dioxide and can set under water. *→ underwater construction*

The hydraulic lime, depending upon the percentage of clayey impurities in the form of silica, alumina and iron oxide, are classified into the following three groups:

- (a) Feebly hydraulic lime - 5 to 10%;
- (b) Moderately hydraulic lime - 10 to 25%; and
- (c) Eminently hydraulic lime - 25 to 30%.

5. **Poor or lean lime.** It is the lime which contains more than 30% of clayey impurities in the form of silica, alumina and iron oxide. Since the mortar made from this type of lime is of poor quality, therefore it is used for inferior type of work.

6.11 Cement *Mortar → Binding material → Cement*

The word 'cement' usually means portland cement used in civil engineering works which sets well under water, hardens quickly and attains strength. Cement differs from lime by the property that it does not slake but sets readily and acquires more strength on setting. The setting power of cement is more than that of lime but cement is similar in many respects to a good quality hydraulic lime. The

* The pan tiles are similar to pot tiles, but are less curved. The pan tiles are comparatively heavier, stronger and durable than curved tiles.

MCQ2 fine materials added to cement to impart useful properties

Strength = Silica + Iron + Lime
in Cement Oxide

various constituents of a *Portland cement are as follows :

MCQ2 Lime - 63%; Silica - 22%; Alumina - 6%; Iron oxide - 3%; Magnesium oxide - 2.5%; Sulphur trioxide - 1.5%; Loss on ignition - 1.5%; Alkalies - 0.5%.

MCQ2 The lime, silica, and iron oxide imparts strength to cement, while alumina gives quick setting property. The alkalies when in excess, causes efflorescence and magnesium oxide and sulphur trioxide are not desirable in excess amounts.

The **manufacture of cement consists of grinding the raw materials (calcareous and argillaceous stones containing silica, alumina and iron oxide) and mixing them intimately in a certain proportion. It is then burnt in a large rotary kiln at a temperature of about 1500°C when the material sinters and partially fuses into balls known as *clinker*. The clinker is cooled and ground to fine powder with some gypsum added, and the resulting product is the commercial Portland cement. The calcium sulphate in the form of gypsum (usually 1 to 3%) is added in order to lengthen the initial setting time of cement.

The cement clinkers consist of the following major compounds :

Tricalcium silicate (4%); Dicalcium silicate (32%); Tricalcium aluminate (10.5%) and Tetra-calcium aluminato ferrite (9%).

The setting and hardening of cement paste is mainly due to ***the hydration and hydrolysis of these compounds. It may be noted that greater the percentage of tricalcium silicate in the cement, the better will be the cement. The tricalcium aluminate and tetracalcium aluminato ferrite compounds are responsible for the initial setting of cement.

6.12 Testing of Portland Cement

The following important tests are carried out for normal setting of Portland cement :

1. Fineness test. This test is conducted to check the proper grinding of cement. The fineness of cement is tested either by sieve method or air permeability method.

The percentage of residue left after sieving good Portland cement in 90 micron IS (Indian standard) sieve should not exceed 10%.

A good Portland cement should not have specific surface less than $2250 \text{ cm}^2/\text{g}$ of cement, if found by air permeability method.

2. Consistency test. This test is conducted to determine the percentage of water required for preparing cement pastes of standard consistency. The consistency test is performed with the help of Vicat's apparatus which determines the initial and final setting time and normal consistency of cement.

Notes : (a) The initial setting time of ordinary and rapid hardening cement should not be less than 30 minutes.

(b) The final setting time of ordinary and rapid hardening cement should not be more than 10 hours.

(c) The normal consistency of Portland cement is about 25%.

3. Soundness test. This test is carried out to detect the presence of uncombined lime and magnesia in cement which causes the expansion of cement. The soundness of cement is tested with Le Chatelier apparatus. According to Indian standard specifications, the expansion should not exceed 10 mm for any type of Portland cement.

4. Tensile strength test. This test is carried out on standard briquettes made of a good Portland cement and standard sand mortar (in 1 : 3 ratio) to determine the tensile strength of cement.

The average tensile strength after 3 and 7 days of curing should not be less than 2 N/mm^2 and 2.5 N/mm^2 respectively.

* See also Chapter 13 on Concrete Technology.

** The wet process or dry process may be employed for the manufacture of cement.

*** The rate of hydration and hydrolysis of cement depends upon its fineness.

= Admixtures

* Plywood has great Resistance to blows than ordinary wood.

6.13 Mortar and Concrete Size of cube = 70.6 mm

The mortar is a paste made by mixing lime, surkhi and water; lime, sand and water; and cement, sand and water. The lime and cement are the binding materials whereas sand and surkhi prevent shrinkage and cracks in setting and give strength to the mortar. The mortar used in concrete is called matrix. It may be noted that the mortar made with coarse sand is stronger than the one made with fine sand.

The concrete is a mixture of cement, sand, brick or stone ballast and water, which when placed in forms and allowed to cure, becomes hard like stone. ^{10/12} It is much stronger in compression than tension. In order to enable it to resist tensile stresses, it is reinforced or strengthened with steel in the form of steel bars or wire netting etc. The concrete so obtained is called reinforced concrete.

Notes :

1. The workability and durability of cement concrete is usually improved by increasing the quantity of cement.
2. The maximum water cement ratio for durable concrete is 0.5.
3. The density of concrete increases with the increase in size of aggregate.
4. The shrinkage of concrete is directly proportional to the contents of cement and water at the time of mixing. It increases with the increase in the percentage of cement.
5. The shrinkage of ordinary concrete is about 0.3 to 0.6 mm / m.
6. The coefficient of linear expansion of concrete is almost the same as that of steel.

6.14 Timber A log of timber - sawn into pieces of desired shape = Lumber.
It is the wood made into a useful form.

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: Wood Residue (core of - 1)

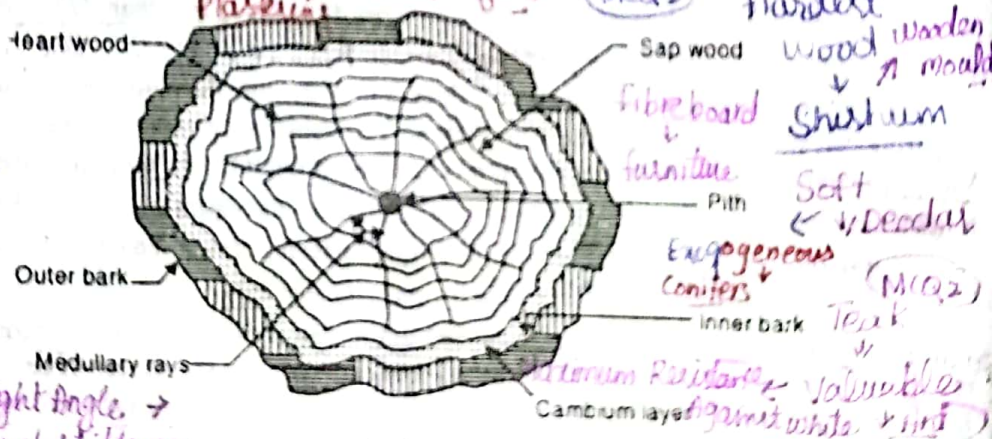


Fig. 6.1

practical limit
of Moisture
Content $\Rightarrow 15\%$
desired = 12%
limit

Plywood $\rightarrow$ veneers $\rightarrow$ right angle $\rightarrow$
 $\downarrow$ high strength and stiffness

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

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

(f) Heart wood. It consists of the inner annular rings around the pith. → Strength

(g) Sapwood. It consists of the outer annular rings between the heart wood and cambium layer. → Growth

(h) Cambium layer. It is a thin layer just below the bark and not converted to sap wood yet. → high durable time > 10 years, Moderate → 5-10 years → low < 10 years

(i) Medullary rays. These are thin radial fibres extending from the pith to cambium layer. → Future growth

(j) Inner bark. It is the inner skin or layer covering the cambium layer. → strength and rigidity

across the grain
along the grain
layer.
high durable time > 10 years, Moderate → 5-10 years → low < 10 years
Future growth
Strength and rigidity
or Applying external stress timber behaves like elastic

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

6.15 Seasoning of Timber → Timber painting → White Lead

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.] *purpose: Increase strength and durability, Reduce shrinkage and warping*
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. *Rapid Seasoning*

6.16 Defects in Timber Important Important Important

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. *Longitudinal separation* *Shake = loss of moisture → Sun*

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. → (Inner → Narrow → Outer → wide) *MCQ2*

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. *Swelling* *Ring*

4. Knot. This defect is caused by the roots of small branches of the tree which are 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. *Reduce Tensile strength across the grains*

5. Foxiness. This defect is caused due to over maturity and unventilated storage of the wood during its transit. *Lack of ventilation* *MCQ2* *Detachment of paint film from surface = Flaking*

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

MCQ2 7. Dry rot. This defect is caused by fungus → Reduce timber to powder, Lack of ventilation

MCQ2 8. Wet rot. This defect is caused by alternating drying and wetting of the timber.

6.17 Paints Texture paint = Trademark Stone finish Colour → Pigment

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 barytes). 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, naphtha 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. *cellulose paint* *case* *Acrylic* *10%*

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. *Most durable → Oil paint* *zinc oxide = white* *Reflection Property*

6.18 Varnishes Most fire Resistant → Asbestos copper Sulphate → Green

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, dammar 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:

∴ Adding extenders in paint ⇒ Pigment Volume Concentration (PVC)

(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).

6.19 Lacquers *paint less durable than enamel paint*

A lacquer is a solution made by dissolving nitrocellulose, resin and plasticizer in a solvent 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 on size. It is used on plastered surfaces not exposed to weather.

Defects in paint

OBJECTIVE TYPE QUESTIONS

1. The rocks formed due to solidification of molten mass laying below or above the earth's surface are called

- (a) aqueous rocks
(c) metamorphic rocks

- (b) sedimentary rocks
(d) igneous rocks

2. The sedimentary rocks are formed due to

- (a) solidification of molten mass lying below or above the earth surface
(b) gradual deposition of materials like sand, clay, etc., generally by setting water
(c) alteration of original structure under heat and excessive pressure
(d) none of the above

3. The rocks formed due to alteration of original structure under heat and excessive pressure are called metamorphic rocks.

- (a) Agree

- (b) Disagree

4. Granite is an example of

- (a) aqueous rocks
(c) metamorphic rocks

- (b) sedimentary rocks
(d) igneous rocks

5. Igneous rock has

- (a) crystalline, glossy or fused texture
(b) foliated structure which is hard and durable
(c) layers of different composition, colour and structure
(d) none of the above

6. Laterite is chemically classified as

- (a) calcareous rock
(c) silicious rock

- (b) argillaceous rock
(d) metamorphic rock

7. The calcareous rocks have as the main constituent.

- (a) lime or calcium carbonate

- (b) clay or alumina

8. Gneiss is chemically classified as

- (a) calcareous rock
(c) silicious rock

- (b) argillaceous rock
(d) none of these

Too Checking Alligatoring Glazing

Pr of G d Cur

Physio

also gran

gran

gives strength in all directions