
UNIT 18

MODERN DECORATIVE TREATMENT

Structure

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18.0 INTRODUCTION

You have already studied about site investigation and selection, planning of buildings, and about foundation, superstructure, doors and windows in the earlier units of this block. In this unit you will be exposed to various kinds of finishing, materials and their uses in beautifying the interior and exterior of buildings. The construction industry is growing and evolving, constantly seeking new and better materials for building and more efficient uses for old ones. The list of construction materials is constantly growing and a basic knowledge of the important ones is essential to anyone engaged in designing and planning, estimating of quantities or actual construction of a building.

Just as it is important that a structure should be strong and stable, it is equally important that the structure be suitably finished as the external appearance is what first comes to view to an onlooker. However well a building is designed, if it is not finished well, the whole thing becomes a distasteful as well as a wasteful exercise. Hence, finishing materials play a major role in accentuating the different parts of a building.

Depending on how they are used, different materials impart Different qualities to the buildings. There are different kinds of finishing materials, some for external and some for internal use. We have some naturally available materials, while some are synthetic. Broadly, the finishing materials can be classified as follows:

- a. Exterior Finishing Materials
- b. Interior Fishing Materials

In this unit, we will study in detail the different types of finishing materials used in building construction.

18.1 OBJECTIVES

After studying this unit, you should be able to:

- identify different exterior and interior finishing materials,
- describe the qualities of different finishing materials,
- describe different roofing materials,
- discuss their functional aspects,
- understand their field of application,
- identify various paving materials, and
- identify different decorative coatings.

18.2 EXTERIOR FINISHING MATERIALS

Exterior finishing materials are used in the exterior walls of the buildings. Commonly used exterior wall facings and materials are discussed in the following paragraphs.

Stone Facing

The term 'stone' usually designates blocks or pieces of basic rock material. It is one of the oldest building materials known to man. Because of its unique characteristics, stone has been regarded as the preferred material in the construction of permanent buildings.

The stone used for building purposes can be classified according to the form in which it is available commercially, such as:

- rubble (field stone),
- cut stone,
- flag stone (flat slabs),
- crushed rock

Stones that are commonly used in buildings include granite, limestone, travertine, marble, serpentine, sandstone, and slate.

Stonework may be divided into three general categories - rubble work, ashlar, and trim.

Rubble work involves using stones that have not been cut but may have had one face - the face that is to be exposed - split or chipped. Two types of rubble work are used, random and coursed. In random rubble work, no attempt is made to produce either horizontal or vertical course lines. In coursed rubble work, horizontal course lines are maintained with no vertical course lines incorporated (Figure 18.1).

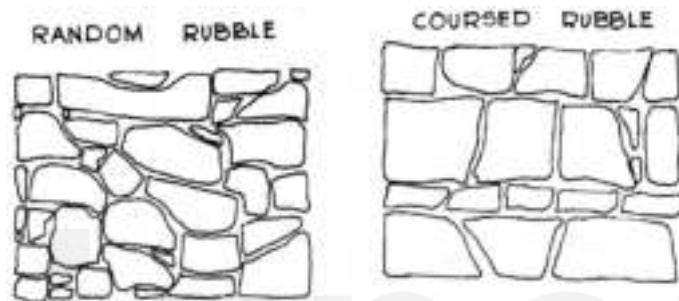


Figure 18.1: Random and Coursed Rubbles



Figure 18.2: Different Types of Ashlers

The term ashlar means only that the stone face showing on the finished surface has its beds and joints sawed or dressed. Ashlar stonework can have a rough, smooth or polished finish, depending on the treatment of

the face. Coursed ashlar has continuous vertical and horizontal joints and random ashlar has neither continuous horizontal nor continuous vertical joints as shown in Figure 18.2.

Ashlar work requires the use of cut stone and includes broken ashlar, irregularly coursed ashlar, and regular coursed ashlar (Figure 18.2). Fieldstone always has a rough, irregular appearance as the natural surface or broken surface of the stone is exposed. Stone trimming involves the use of stones cut for a specific purpose and includes quoins, jambs, sills, belts, copings, *cornices*, lintels, steps, and arch stones. Quoins are stones laid at the intersection of two walls. They can be emphasized by letting them project beyond the vertical plane of the wall *or* by using a contrasting color or type. Usually, they are laid so that they appear alternately as long and short stones on each side of the corner as shown in (Figure 18.3).

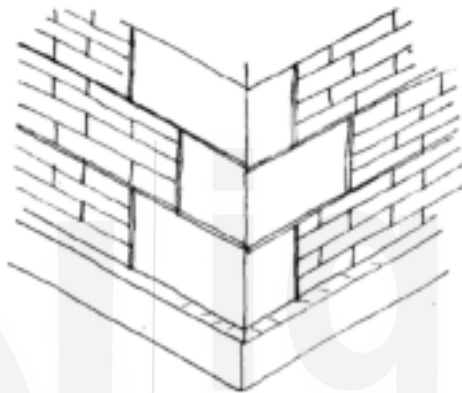


Figure 18.3: Stone Quoins

Sills are the stones that form the bottom of window and door openings, and these are of two types, slip sills and lug sills. The ends of the lug sills extend under the jambs and consequently carry a part of the wall load, while slip sills fit between the jambs. All sills should have a wash-a slope on the upper surface to provide for water runoff. Sills should also be provided with a drip to prevent water from running back to the wall along the underside of the sill (Figure 18.4).



Figure 18.4: Types of Sills

Belts are special stone courses that are built into a wall for a particular purpose. One purpose for a belt course is to provide architectural relief to a large wall of one material or to provide a break in the vertical plane of the wall. A belt course also provides a convenient means of hiding a change in wall thickness as shown in Figure 18.5.

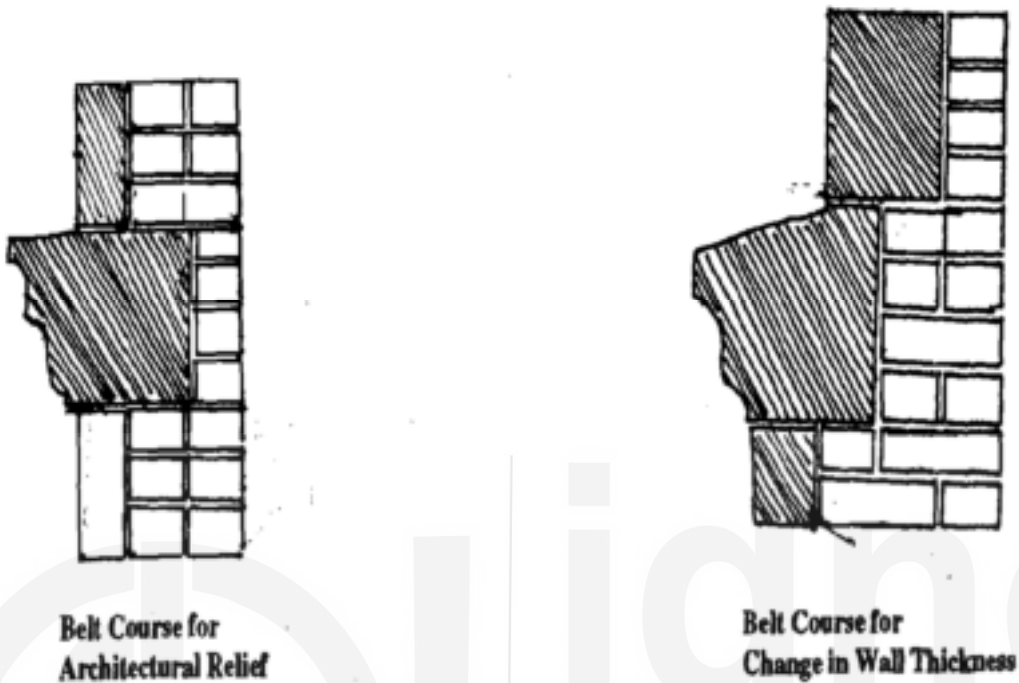


Figure 18.5: Belt Course

A coping stone is one which is cut to fit on the top of a masonry wall. It prevents the passage of water into the walls, sheds water to either the inside or the outside of the wall, and gives a finished appearance to the wall as shown in Figure 18.6. Cornice stones are also specially cut stones which are built-in to project from a masonry wall near the top to provide the appearance of an eave. Sometimes two or more stones of varying widths are used to provide the projection with adequate support (Figure 18.7).

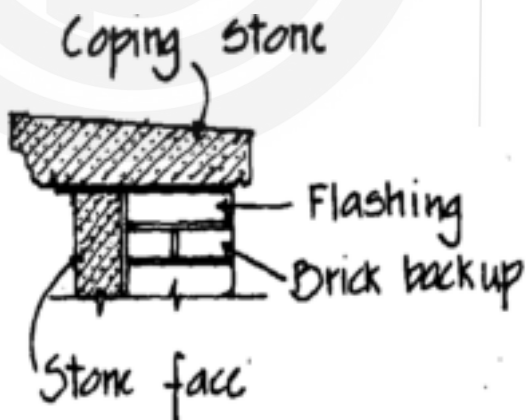


Figure: 18.6: Stone Coping

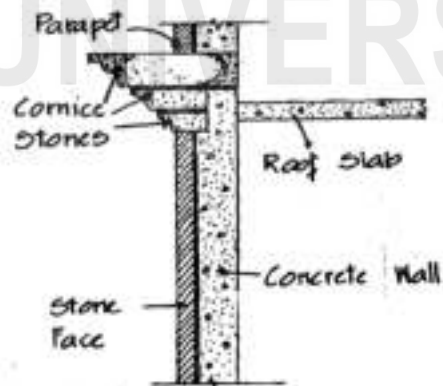


Figure: 18.6: Three Piece Cornice

Lintels are stones which bridge the top of door and window openings (Figure 18.8). Stone steps are made to fit over an inclined concrete slab or to cap steps cast in concrete (Figure 18.9). Arch stones are cut to form some particular type of arch over a door or window opening. An arch is thus used in place of a lintel. A number of arch types are used, including semicircular, elliptical, segmental, gothic, and flat. In each case, the stones are cut to form the required outline of an arch (Figure 18.10).

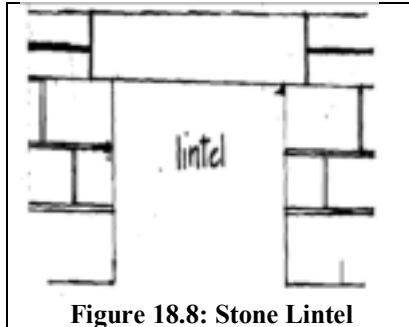


Figure 18.8: Stone Lintel

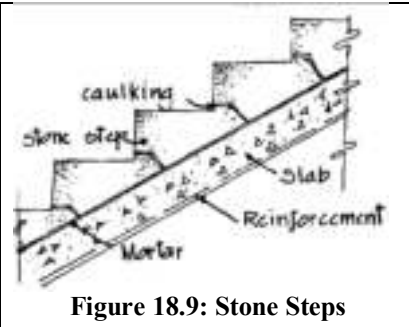


Figure 18.9: Stone Steps

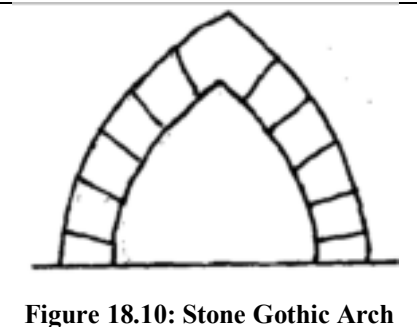


Figure 18.10: Stone Gothic Arch

Granite: Granite comes in combinations of colored crystals which give an overall appearance of a white, grey, pink, red, brown, green, blue or black stone. *Granite* building stones are divided into two general types -cut stone and ashlar type stone.

Cut stone, which consists of large thin slabs of sawed polished granite $\frac{7}{8}$ inch thick at the minimum and going up to $2\frac{1}{2}$ inches (63 mm) at the most, is applied to the exterior surface of the building. Molded sills, copings, lintels, window and door trims, columns, and stair treads are built with cut stones or ashlar type of stonework (figure 18.11).

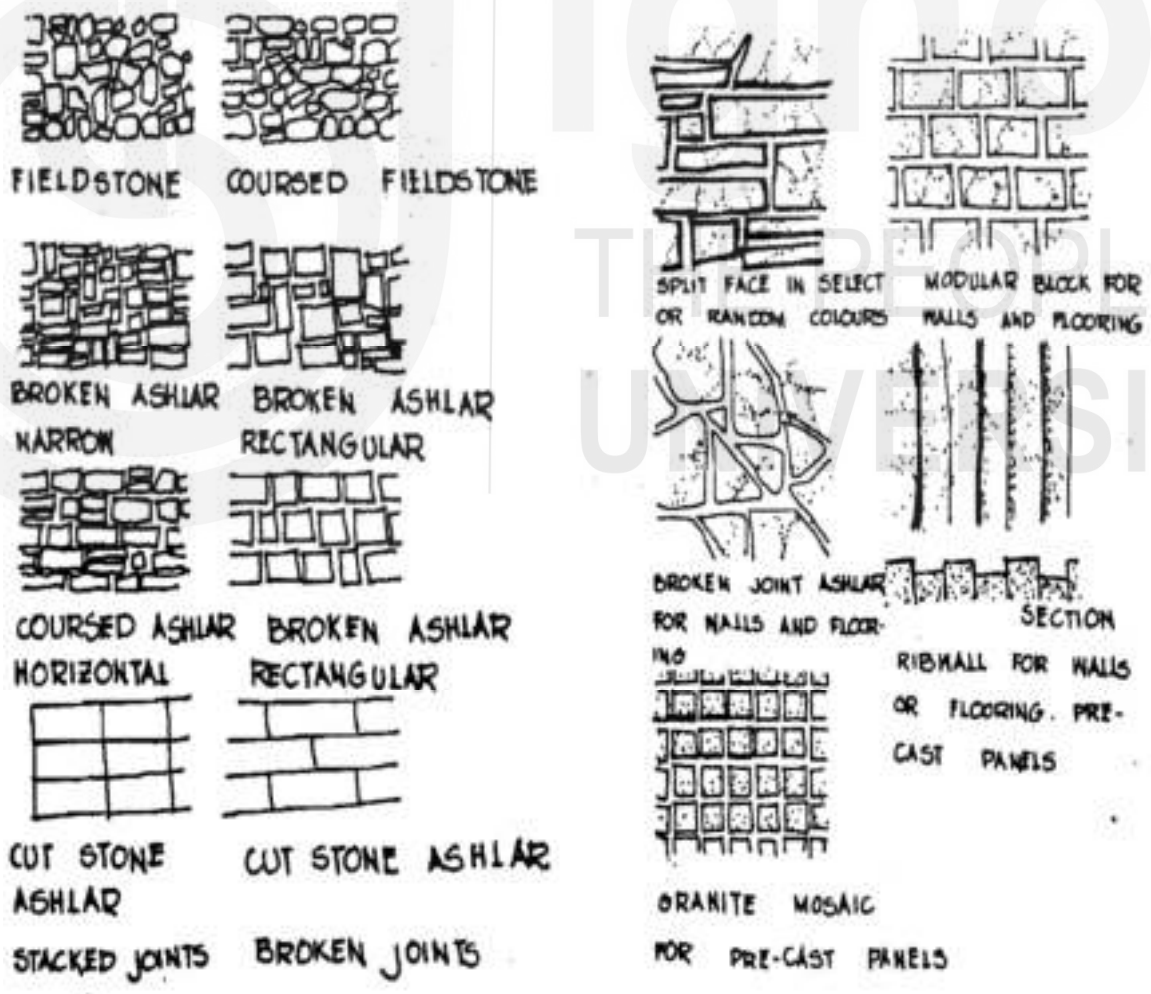


Figure 18.11: Cut and Ashlar Type Granite Stone

Limestone: Limestone is a sedimentary rock made up chiefly of calcareous shells of organisms that live in oceans and lakes.

Building limestone is available in grey and buff colors and in combinations of these two colors. Building limestone is described under two general categories - cut stone and ashlar.

- a. Cut stone includes veneer and stock shapes such as molded sills, copings, lintels, window and door trims, and columns which are used with cut stone veneer or ashlar-type stonework. A veneer consists of large, thin slabs of limestone applied as an exterior or interior surface finish to a building. Veneer slabs are also formed into panels for curtain-wall construction.
- b. Ashlar stone consists of smaller, thicker pieces of limestone that are laid in various ashlar patterns and used as a veneer on the exterior or interior of buildings.

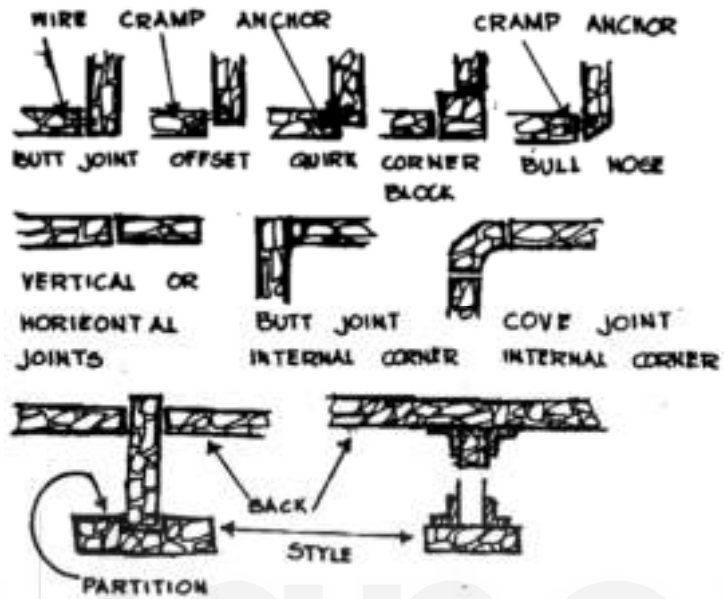
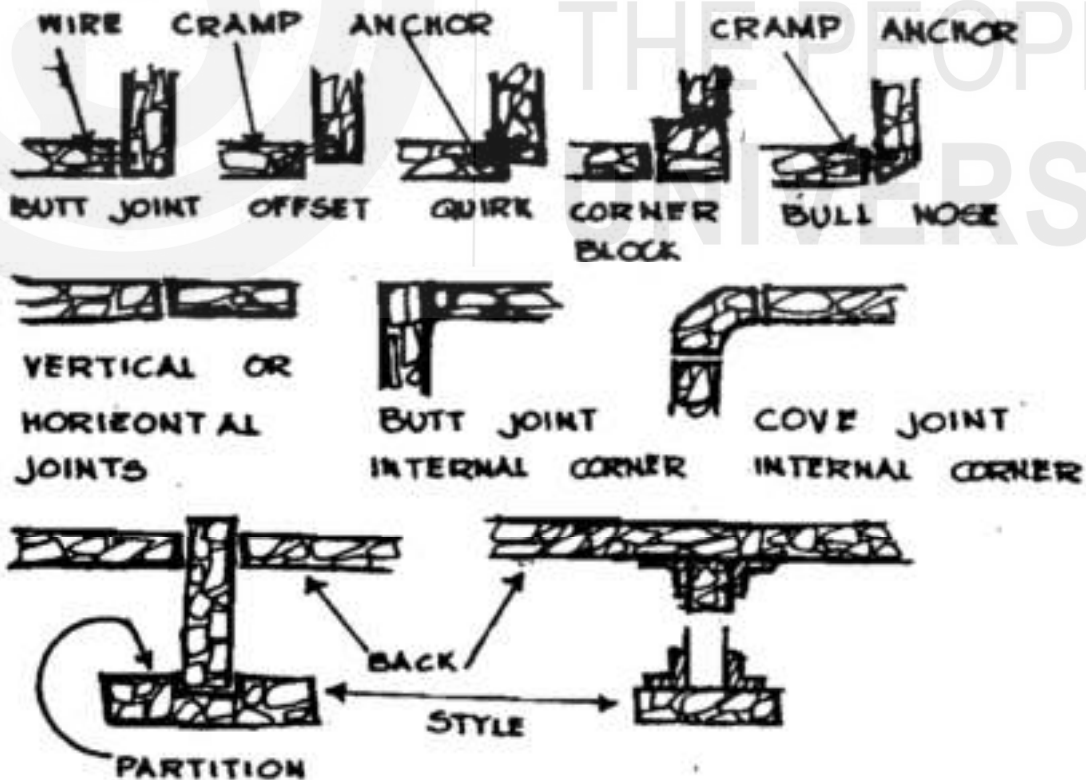


Figure 18.12: Toilet Room Partition Joints



Marble: The word marble is derived from the Latin root *mar*, meaning a shining tone. Marble varies in its color from white to black and is found in innumerable variations of veining and color combinations. Marble for use in the exterior and interior of buildings comes in various sizes and thicknesses and requires various kinds of setting beds and types of joints. Marble finds great use as a material for all types of sculpture and monuments. Cut stone usually consists of a large, thick slab of stone with its face smooth, textured, slightly textured, or polished (Figure 18.12).

Brick Veneer: Brick is one of the oldest building materials known to man and the manufacture of this clay product still follows the same basic procedures developed in the past.

Common bricks are normally made with smooth surfaces, but bricks to be used for facing are very often given some type of surface treatment — a texture applied as the columns of clay leave the die in the stiff-mud process, a glaze, or a color variation produced by flashing.

Bricks are used in the building walls in the following ways:

1. to form a solid brick wall,
2. to build a cavity wall,
3. to build a partition wall, and
4. to face walls built of some other material with a veneer of brick, usually 4" thick (Figures 7.13 and 7.14).

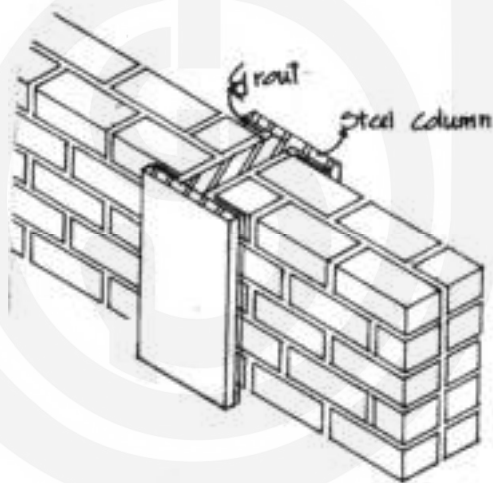


Figure 18.13: Exposed Steel Frame

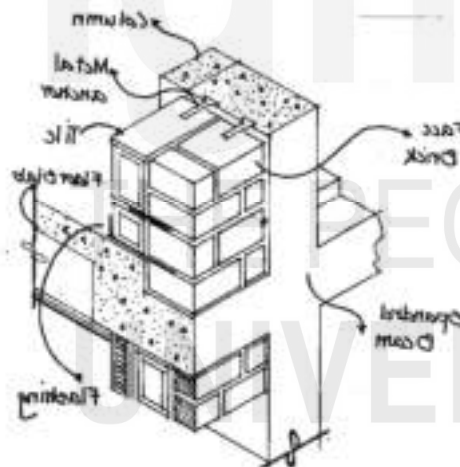


Figure 18.14: Brick Keyed to Spandrel Beam

Brick veneering over a light wood frame is done in two ways. One is to use regular brick, laid up to produce a 4" thickness of the veneer. The other method is to use thin slabs of brick manufactured for the purpose. There are two methods of these constructions: one is to lay up, the brick over the sheathing, using metal ties nailed to the sheathing to hold the brick in place; and the other is to cover the studs with paper-backed wire mesh, apply a 1" thick layer of mortar and set the bricks with their backs in the mortar. Any type of face brick can be used. When the veneer slabs are used they are set in a mortar base which is applied over a stucco wire backing.

Brick curtain walls may be formed in several different ways in conjunction with steel or reinforced concrete frame buildings. The wall can be covered with face brick (over a backup wall of common brick), clay tile, or concrete block.

Terracotta Facing (Ceramic Veneer): In Italian, 'Terra Cotta' literally means cooked or baked earth. It was first used extensively as a construction material by Egyptians, Greeks, and Etruscans. The Romans also used terracotta as a substitute for stone in construction work and developed its Ornamental use in buildings.

Today terracotta is known as a ceramic veneer. The color range of this natural, unglazed ceramic veneer is usually dull ochre to red. It can vary according to the clay's composition and the firing temperature.

Finishes: The surface features of ceramic-veneer finishes vary over a large *range* which includes the following types:

- a. smooth finish
- b. scored finish
- c. combed finish
- d. roughened finish
- e. ceramic glaze
- f. non-lustrous glaze
- g. ceramic color glaze
- h. polychrome finish

Texture refers to surface qualities other than color and includes the surface finishes just listed and any elaboration thereof. An extruded ceramic veneer is available in smooth, beveled, fluted, and scored surface textures. In handmade types, varieties of textures are possible.

Extruded Ceramic Veneer: This includes:

1. adhesion type of ceramic *veneer* (*not* more than 9" thick), and
2. anchor type (not less than 14" thick).

Handmade Ceramic Veneer

This may be of three types

- a. closed back
- b. open back
- c. solid slab (anchor type)

The shells and webs of hand-made ceramic veneer must be properly proportioned and able to resist expansion and contraction stress when they are burned.

Prefabricated Ceramic Veneer Panel

A prefabricated ceramic veneer panel consisting of a ceramic veneer facing with a lightweight concrete backing and reinforcing is available for curtain wall construction (Figure 18.15).

Ornamental Uses: Sculptural reproduction can be obtained in ceramic veneer, either plain or in polychrome colors. Decorative, perforated ceramic veneer units are now available for use as screens, grills, and facades for architectural work.

Texture Finishes

Stucco: Stucco is a type of plaster made with Portland cement which is applied to exterior surfaces as a finish coating. It can be applied directly to masonry walls, but over the wood sheathing, some type of wire must be used to tie the sheathing and stucco together. Either a woven wire mesh or expanded metal lath can be used. In either case, the openings should be large, enough to permit the first coat to be forced through

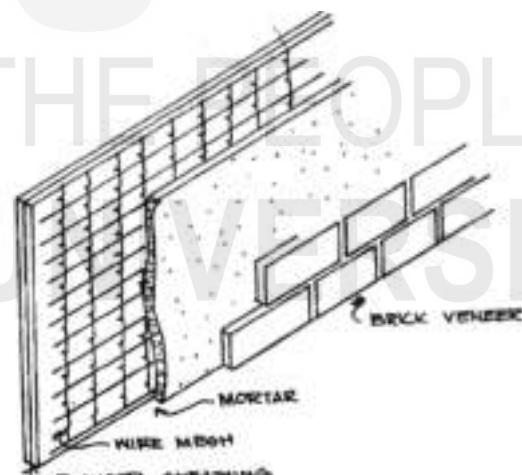


Figure 18.15: Brick Veneer Set in Mortar Backing

the openings to embed the wire completely. The wire should not be less than 1/4" away from the sheathing and should be railed every 8" to 9" (Figure 7.16).

Stucco is applied in three coats, a base or scratch coat, a second or brown coat, and a final finish coat. All three coats are composed of 1 volume of Portland cement to 3-5 volumes of clean sharp sand.

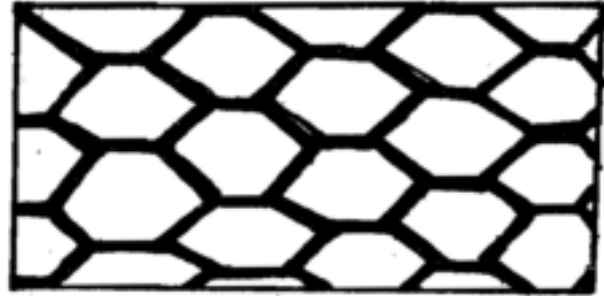


Figure 18.16: Expanded Metal Lath

The scratch and brown coats should be applied about 3/8" thick with sufficient time between applications to allow for proper curing. Each coat should be kept moist for at least 48 hours. The final coat should not be less than 1/8" thick and should be applied not sooner than seven days after application of the brown coat. Mineral color may be added to the finish coat, or already prepared and colored dry stucco is available for finish coats. A variety of treatments can be given to the finish coat to produce certain textures. Among the treatments commonly used are French trowel, spatter dash, Italian finish and travertine coarse; and colored pebbles may be sprayed against the newly applied finish coat to produce a pebble dash finish.

Granule-Texture Finishes: These finishes are made up of granules of various materials like mosaic, glass, sand, plastic, other synthetic materials etc. These are mixed with coloring pigments to get the required shades and appropriate resin is used as a binding material to help to fix the wall.

Flaked-Textures: These are the same as above except for the fact that granules will be replaced by flakes of the same basic material.

18.3 PAVING AND PAVED SURFACES

The main function of any paving is to provide a hard surface over and above the following functions:

| | | |
|---|----------------|---|
| 1 | Practicability | to provide a dry, non-slippery surface |
| 2 | Direction | to provide a sense of direction to the user |
| 3 | Repose | to provide a sense of repose |
| 4 | Hazard | to provide an indication of hazard by the change of material on a given surface |
| 5 | Scale | to reduce scale |
| 6 | Use | to indicate ownership and use |
| 7 | Character | to reinforce the character of a particular place |

Some Paving Materials

Concrete: For domestic use concrete is laid in situ as a paving material usually for satisfactory results, and the surface is given some finish and the whole is broken into smaller elements to prevent cracking due to temperature stresses. A coarse gravel aggregate used in the concrete mix when brushed 'green', will give an attractive broken surface.

Asphalt (Tarmacadam): A bitumen or tarmacadam surface is seldom needed except perhaps in a large garden as a fitter between the concrete or stone slabs paved on a path. It can be used as a surface of a drive, but the price is usually a prohibiting factor and such a hard and durable surface is seldom necessary for light traffic.

Cold Asphalt: This is a mixture of bitumen and crushed rock. It is more likely to be used on a small scale and can be laid anywhere, where there is adequate maneuvering space for a roller to provide thorough compaction which is necessary.

Pre-cast Slabs: By far the most commonly used hard garden material is the precast slab which is comparatively cheaper and easier to lay and provides a non-slip, dry and durable surface. Slabs can be laid in a variety of patterns by using different sizes. The jointing of the slabs is important. Rubbing back the mortar 1/8" or so between the slabs shows them up to advantage, but the joint should not be wide enough or deep enough to trap an umbrella stick or a stiletto heel.

Stone Paving: Flagstone and slate for paving come in both square and rectangular shapes and are laid in a similar manner as precast concrete slabs. New stone paving is apt to be of a uniform thickness, but old stones or slates are uneven, and the foundation levels should be altered accordingly. Where large heavy slabs are being laid, a mortar bed is unnecessary.

Brick Paving: Brick paving, is expensive due to the material as well the labor involved being costly. Even if one buys second-hand bricks, one has to pay for the labor of cleaning the mortar off these bricks. But, there is often no substitute for the sharp outline, the color and patterns that one gets in brick paving (Figure 18.17). Bricks are also useful

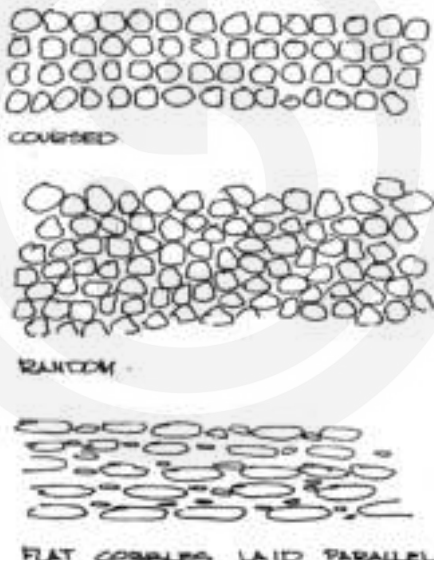


Figure 18.18: Cobbled Paving

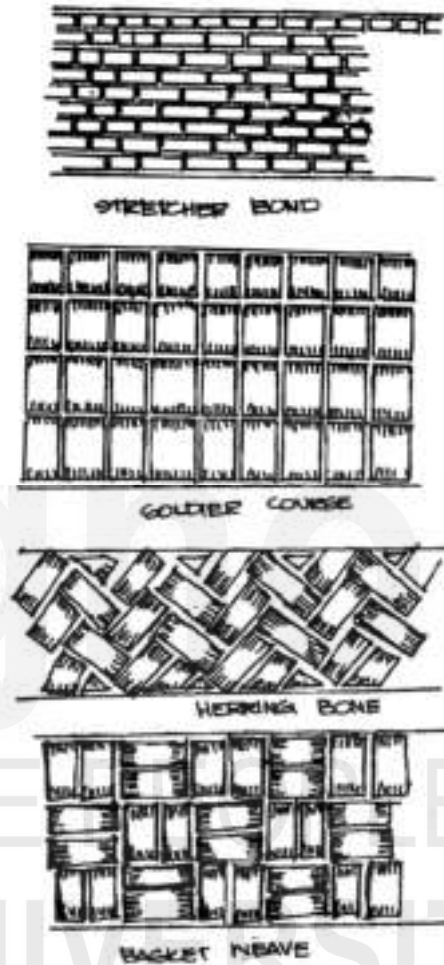


Figure 18.17: Different Patterns of Brick Paving

for making curving paths without creating the large V-shaped joints which occur when other larger sized material blocks are used.

Cobble Stones: Cobbles are rounded, water-worn egg-shaped stones and come in sizes from 1" up to about 1" in diameter. Cobbles are considered for paving only in very few cases as it is most difficult to walk over them due to their roundness. Cobbles are also useful for infilling awkward corners round an area that has been laid with a larger element that cannot be cut to shape (Figure 18.18).

18.4 ROOFING MATERIALS

The roof of a building is made up of three components:

- a. The frame or skeleton,
- b. The rigid inner layer or skin is fastened to the frame and supports the outer skin, and
- c. The exposed outer layer.

The exposed outer, waterproof layer of the roof is known as roofing. Roofing materials include shingles of all kinds, wooden shakes, various kinds of roofing tiles, slate, sheet metal, asbestos cement sheet roofing, asphalt roofing, glass, and plastics.

Shingles: A common method of weather-proofing a sloping roof is to cover it with shingles or shakes. While originally both were made exclusively from wood, shingles are now made from asphalt-impregnated felt paper, asbestos cement, and sheet aluminum.

Wood Singles: Several species of wood are used to make wood shingles, including some pines, Redwood, and red cedar. The portion of a roof shingle that should be exposed to the weather depends on the pitch of the roof and the length of the shingle used.

Wood Shakes: Shakes are used for the same purpose as shingles but are split rather than saved from cedar blocks. This produces a much rougher face than the wood shingles.

Asphalt Shingles: Asphalt shingles are made from heavy rag felt saturated with asphalt and coated with high-melting-point flexible asphalt. Ceramic coated mineral granules are pressed into the asphalt coating on the exposed face to provide a fire resistance surface. Over a range of weights and styles, shingles are made, each in a wide variety of colors.

Asbestos Cement Shingles: Asbestos cement shingles are made from a combination of asbestos fibers in Portland cement paste. To this mix is added quantities of small, colored ceramic granules to produce permanent hues.

Roofing Tiles: Roofing tiles are basically a terracotta product, designed to be applied to a roof in a manner similar to shingles. But because of their weight a strong framework or based is required.

Slate: Because of its structure, slate rock is easily split into thin slabs suitable for roofing. The surface of the slates may be left in its rough textured state or ground to produce a smooth surface. Slate may be laid over a concrete surface, over gypsum or terracotta the or over a wood deck. Roof frames must be strong and well braced for supporting slate roofing which is very heavy.

Asbestos Sheet Roofing: Common types of corrugated AC sheets are used as roofing units, either over a sloped deck or fastened to a wood or steel roof frame. Roofing sheets of this type are held in place by bolts, nails, screws and other fastening devices.

Plastic Roofing: Corrugated plastic sheets reinforced with glass fiber (reinforced plastics) are also used for roofing. They are either translucent or available in different colours. Sheets of clear vinyl plastic are also used for roofing particularly for such structures as green houses, conservatories and factory buildings.

18.5 INTERIOR FINISHING MATERIALS

The materials which are used to finish the interior walls and ceilings of buildings include wood, gypsum, clay products, stone, concrete, fiber boards, paper, glass, steel, nonferrous metals, plastics, and paints. A variety of products have been developed from each basic material so that a wide choice of finishes is available in respect of any material.

Wood Finishes

Interior finishing materials of wood can be divided into two basic groups:

- a. those used to cover walls and ceilings, and

- b. those used as trim materials around door and window openings, as baseboard and as various decorative moldings.

Wall and ceiling, coverings can also be divided into two groups:

- a. those made of solid wood, and
- b. those made of plywood.

Gypsum Finishes: One of the best-known types of interior finishes is produced by the plastering material in which gypsum is one of the basic ingredients. Plaster surfaces can be troweled smooth, stippled or sand-finished. Gypsum Board is also used as an interior finishing material.

Clay Finishes: Clay products of all kinds can be used for interior finishing. They include common brick, face brick, glazed brick, structural tile, glazed tile, ceramic veneer, ceramic wall tile and ceramic mosaic.

Stone Finishes: Stone interior finishes can be produced by using solid stone on exposed interior as well as exterior surface of a wall. Any type of building stone may be used for this purpose. The other method is to cover the interior surface with thin stone slabs, from 1" - 2" thick. The stone is applied over a back up wall of concrete, concrete block, brick or tile and is held in place with some type of stone anchor. A number of imitation stone products made from terracotta are also used for this purpose.

Concrete Finishes: Concrete is used in various ways for interior work. Plain concrete walls are often given special treatment to make them as smooth as possible. Textured and patterned surfaces are produced by special treatment of the form face. Pre-cast concrete panels often have one face finished for interior exposure. The face may be textured, patterned or coloured, or it may consist of exposed aggregate. Concrete blocks with a glazed face are also produced for interior use.

Hardboard Finishing Panels: Tempered hardboard is treated in many ways to produce interior facing panels.

Fiber Board Panels: These panels may be used as interior finish material on ceilings or on walls, particularly above dado level. For ceilings the board may be in the form of tiles, strips and panels. Panels may be plain-faced or marked off by V grooves in a file pattern.

Wall Paper: Paper has been used as an interior decorative material for a long time and still finds wide acceptance for many situations. In addition to the conventional designs, wall paper is produced in a wide range of wood grain, fabric, stone, brick and mural patterns. Wall papers are produced in single and double rolls 20- 36' wide containing 36 sq. ft. per single roll.

Glass: Glass in several forms is used for inside finishing. Glass blocks are used for decoration as well as for light-diffusing or light-directing purposes. Plate glass mirrors are used to produce special effects. Colored glass tiles or panels, tinted glass etc. are also available as a type of wall finish.

Steel, Non-ferrous Metal, Plastics: All of these materials are used to produce a number of products adopted to interior finishing.

Cork Tiles: Cork, as excellent acoustic material is available in the form of tiles. It can be used for almost any interior application in floors, walls, panels, partitions and ceilings. They are resistant to fire and most chemicals. They are quite durable.

18.5.1 Floor Finishes

A great many materials are used as flooring as a final wearing surface which is applied over the subfloor. The choice of material for any particular room or area depends on a number of factors: the type of building involved (domestic, commercial or industrial); type of usage to which the floor will be subjected (light, medium, heavy foot traffic areas); and any special requirements such as sound - absorption qualities, color, texture, resistance to chemical, resistance to abrasion and ease of maintenance. Flooring materials can be broadly classified into:

- | | | |
|---|--------------------|---|
| a | Hard floor | natural stone, clay/ceramic tiles, and cement/cement-based floors |
| b | Wooden floors | hardwood, softwood, and parquet |
| c | Soft Floors | Specialized Floors |
| d | Floor Covering | carpets, dhurries, rugs and other floor furnishings |
| e | Specialized Floors | mild steel/iron tiles, plastics, seamless, aluminium |

Hard Floors

Natural Stone

| <i>Material</i> | <i>Usage</i> | <i>Remarks</i> |
|-----------------|---------------------|--|
| Cuddapah | All purpose | Available only in black, and therefore not widely used in bathrooms, main rooms, etc. Economical |
| Granite | All purpose | Elegant and durable. Expensive |
| Kotah Limestone | All purpose | Available only in dark colours and therefore not widely used in bathrooms main rooms etc. |
| Marble | All purpose | Elegant, durable and expensive |
| Quartzite | All purpose | Economical |
| Sandstone | Light traffic areas | Economical |
| Shahabad | All purpose | Economical |
| Slate | All purpose | Economical |

ii. Cement/Cement Based

| <i>Material</i> | <i>Usage</i> | <i>Remarks</i> |
|---------------------------|--|---|
| Cement/Concrete (in situ) | All purpose including industrial floor | Mix properties depends on end use |
| Terrazzo Floors (in situ) | All purpose | Frequently laid where a high standard of appearance and cleanliness is required |
| Mosaic of Tiles | All purpose | Not suitable in areas where a high degree cleanliness is required |
| Other Cement based Tiles | All purpose | Available in a variety of design and shapes |

iii. Clay/Ceramic Tiles

Sintered* Clay/ Ceramic Glazed Tiles All purpose
 Unglazed or Quarry Tiles All purpose

* The new single-firing technology for ceramic glazed tiles ensures better durability and longer preservation of glaze. These tiles are available in varying thicknesses depending on whether they are used on floors or walls. It is to be ensured that floor tiles are used for floors and wall tiles for walls only.

Wooden Floors

| <i>Material</i> | <i>Usage</i> | <i>Remarks</i> |
|-----------------|--------------------------------|--|
| Hard Wood | Heavy foot traffic area | Often covered by carpets. A good seal will enhance durability. |
| Soft Wood | Light foot traffic area | Can be painted with polyurethane paints. |
| Parquet | Light Medium foot traffic area | Often covered by carpets. Can be painted with polyurethane paints. |

Soft Floors

| <i>Material</i> | <i>Usage</i> | <i>Remarks</i> |
|---------------------------|--------------------------------|---|
| Coir Tiles | Light Medium foot traffic area | Avoid using in water prone areas |
| Cork Tiles | Light-Heavy foot traffic areas | Avoid using in water prone areas |
| Linoleum | Light-Heavy foot traffic areas | Also available with anti-static* properties |
| PVC (Vinyl) with Asbestos | Light-Heavy foot traffic areas | Also available with anti-static* properties |
| Vinyl (PVC) | Light-Heavy foot traffic areas | Also available with anti-static* properties |

* for anti-static applications these materials are provided with carbon and galvanized wire mesh to aid conductivity.

Wooden Floors

| <i>Material</i> | <i>Usage</i> | <i>Remarks</i> |
|------------------------------------|--------------|----------------|
| <i>Carpets from Natural Fibers</i> | | |

| | | |
|--------|--------------------------|---|
| Wool | Light foot traffic areas | Should not be exposed to excess sunlight. Avoid <i>using in</i> water prone areas |
| Cotton | Light foot traffic areas | Should not be exposed to sunlight. Avoid using in water prone areas. Cotton fibres are not very resilient |

ii. **Carpet from Synthetic Fibers**

| | | |
|-------------------------|--------------------------------|--|
| Nylon/Rayon and polymer | Light-heavy foot traffic areas | Can be used even in damp areas. Resistant to moisture rot and mildew. Static electricity is prone to build up on these carpets |
|-------------------------|--------------------------------|--|

| | | |
|----------------|---------------------------------|---------------------------------|
| iii. Coir Mats | Light-medium foot traffic areas | Can be used in dust prone areas |
|----------------|---------------------------------|---------------------------------|

| | | |
|-----------------------|---------------------------------|--------------------------------|
| iv. Rugs and Dhurries | Light-medium foot traffic areas | Can be used as decorative item |
|-----------------------|---------------------------------|--------------------------------|

Specialized Floors
Material

| <i>Material</i> | <i>Usage</i> | <i>Remarks</i> |
|----------------------------|--|---|
| Iron and Steel | Heavy Industrial areas | Not suitable for wet or oily conditions |
| Aluminum | Heavy traffic areas. Used especially in computer rooms | It does not generate sparks when struck with another metal. |
| Plastic Seamless Floorings | Heavy industrial areas | Decorative seamless flooring is only suitable for light foot traffic areas. Polyester resin flooring is not suitable for food processing factories as it is attacked by citric and acetic acid. |

NOTE

“All purpose” refers to the usage of a material in the following three areas of human activities:

- a. Domestic houses, flats etc.
- b. Commercial offices, shops, schools etc.
- c. Public buildings

“Light foot traffic” refers to seldom-used areas, e.g. floors in houses, executive cabins etc. "Medium foot traffic" refers to moderately-used areas e.g. floors in commercial establishments.

“Heavy foot traffic” refers to much used areas e.g. floors in public buildings and reception room of offices.

18.5.2 Wall Finishes

Walls could be constructed using brick, stone, pre-cast concrete, mud/clay or wood. Brick, stone and pre-cast concrete walls are usually plastered (sometimes the first two types are only cement- or surkhi-pointed) and then painted or given some other wall finish. Most wall finishes detailed in this section are possible only on cement plastered walls though these coverings can be applied on any wall type.

Description of Wall Finishes

| | | |
|---|---|--|
| a | Chettinad/Brick Tiles | Decorative, earthy tiles for both interior and exterior walls |
| b | Clay/Ceramic Tiles | Dados in kitchens, wash-areas and toilets. Also skirting in rooms with tiled floors |
| c | Cork Tiles/Sheets | Decorative finish for wood/plastered walls. Good acoustic material |
| d | Coir Tiles/Sheets | Decorative finish for wood/plastered walls. Good acoustic material |
| e | FRP Boards (Fibre Reinforced Plastic) | Maintenance free, pre-painted boards for wall paneling |
| f | Glass Tiles/Sheets | Decorative finish for walls |
| g | Gypsum Board | Bonded plaster board for interior walls (non-damp prone areas unless protected by other impervious materials like ceramic tiles) |
| h | Laminates | Decorative finish especially for use on wood and wood based materials |
| i | Mirror | Reflective, decorative finish used to create an illusion of space and also used at corridor corners |
| j | Mosaic Tiles | Dados in kitchens, wash areas and toilets. Also skirting in rooms with mosaic or terrazzo floors |
| k | Other Cement Based Tiles | Decorative tiles for interior and exterior walls |
| l | Natural Stone- Cuddapah, Granite, Kotah | Marble and granite are used in interior walls as a decorative finish. All natural stones can be used as external cladding |
| m | PVC Sheets | Maintenance free, pre-painted wall panels, skirting and cladding |
| n | Paints | (refer section on paints) |
| o | Reflective Acrylic | Reflective, decorative, light-weight finish used to create an illusion of space and also used at corridor corners |

- | | | |
|---|----------------------------|---|
| p | Wood and Wood Based Boards | Widely used for any panelling in interior walls |
| q | Rigid Polyurethane Panels | Panels available with several decorative facings for interior walls |

Description of Wall Coverings

- | <i>Material</i> | <i>Usage</i> |
|--|--|
| i. Coir Mats | Fixed on a wooden frame onto interior walls |
| ii. Jute Mats | Fixed on a wooden frame onto interior walls |
| iii. Hessian | Fixed with an adhesive directly onto interior walls |
| iv. Vinyl | Decorative wall covering. Available in several designs and colours and in pre-pasted form |
| v. Wall Paper | Decorative wall covering. Available in several designs and colours |
| vi. Wall Fabrics Velvet Suede Polymer coated fabric | Fixed with an adhesive Fixed with an adhesive Decorative wall covering. Available in several designs and colors and in pre-pasted form |

18.5.3 Suspended Ceilings

False ceilings are done in rooms that have high ceilings to either improve the visual appeal of the room or to decrease air-conditioning and lighting costs. These ceilings have to be suspended on a frame of iron, steel, aluminum or wood.

Description of Suspended Ceilings

Frame

Can be combined with

- | | |
|----------------|---|
| i. Aluminum | Wood, plywood, particle board, block board, pre-laminated particle board, ceiling tiles, gypboard, PVC panles, glass, mirror, acrylic, reflective acrylic, fibre glass, aluminum sheet, fibre board, rigid polyurethane |
| ii. Iron/Steel | Wood, plywood, particle board, block board, pre-laminated particle board, ceiling tiles, gypboard; PVC panels, glass, mirror, acrylic, reflective acrylic, fibre glass, aluminum sheet, fibre board, rigid polyurethane |
| iii. Wood | Plywood, particle board, block board, pre-laminatedparticle board, ceiling tiles, gypboard, PVC panels, glass, mirror, acrylic, reflective acrylic, fibre glass, aluminum sheet, fibre board, rigid polyurethane |

Finishes for ceilings

In general, ceiling finishes can be classified as:

- a. Paints
- b. Plaster of Paris
- c. Decorative wood work

18.6 DECORATIVE COATINGS

For ages man has been painting the items composing his building to protect and decorate them. Today painting may be done for one or more of a number of reasons. They include decoration, sanitation, preservation, improved lighting effects, improved heating effects, improved working conditions, safety and economy.

Paints: While traditionally a paint has been a material with an oil as one of the chief ingredients, many new advances have taken place in the paint industry in recent years: oil based paints are being supplemented by alkyd paint, resin, emulsion paint, metallic paint, luminescent paint, cement paint, enamel paint and distemper.

Oil Paints

The basic components of an oil based paint are listed as under:

- | | |
|-------------|-------------|
| (a) body | (b) vehicle |
| (c) pigment | (d) thinner |
| (e) drier | |

The body of a paint is that solid finely ground material which gives a paint the power to hide, as well as color, a surface. In white paints the body is also the pigment. The products most widely used for the body of the paint are white lead, zinc oxide, lithopone and titanium white.

White Lead: Basic carbonate of lead or basic sulfate of lead is the most widely used body of a paint that is available in the market. It reacts chemically and physically with linseed oil and for this reason will produce a durable paint when used along with oil. It has good hiding power and upon aging leaves a good surface for repainting because of the gradual chalking that takes place. However, white lead is poisonous and white lead paint should be confined to outdoor applications, where its fumes are less dangerous to the painter.

Zinc Oxide: It has desirable characteristics of a good paint, and is used in combination with white lead producing greater hardness and durability, better color retention, greater elasticity and reduced chalking. It has less tendency to turn yellow when compared to some paints based on other body materials.

Lithopone: Is a paint body material made by mixing barium sulfide with zinc sulfate. It is most widely used in making interior paints.

The paint vehicle is a nonvolatile fluid in which the solid body material is suspended. The vehicle should consist of from 85-90% drying oil and the remainder should be thinner and drier. The drying oils include linseed oil, soya bean oil, fish oil, dehydrated castor oil, tung oil, perilla oil, and oiticica oil.

Pigments: Pigments are the materials which give a paint its colour. These are classified into two basic groups:

- a. natural pigments
- b. synthetic or manufactured pigments

Natural pigments are obtained from animal, vegetable and mineral sources. Most of them are composed of mineral oxides, such as iron oxide, chrome oxide, cobalt oxide, siennas, ochres and

ambers. Carbon black is also used as a pigment. Many of the synthetic pigments are phthalocyanines (coal tar derivatives) similar to those used to make dyes.

Thinners: These are volatile solvent materials which have a natural affinity for the vehicle in the paint. They cause the paint to flow better. They evaporate when the paint is applied. One of the most common thinners for oil based paints is turpentine.

Driers: These are organic salts of various metals, such as iron, zinc, cobalt and manganese and calcium, which are added to the paint to accelerate the oxidation and hardening of the vehicle. Litharge, (lead oxide) is a drier commonly used with lead based paints; zinc sulphate and manganese oxide are used with zinc oxide based paints.

Alkyd Paints: Alkyd paints are so called because of the synthetic resin - alkyd resin - used in the paint formulation. Alkyd resin is obtained by the combining of an alcohol and an acid. Alkyd paints are produced by combining a drying oil, such as linseed oil or dehydrated castor oil with glycerine (the alcohol) and phthalic anhydride (the acid). Glycerine neutralizes the phthalic anhydride and the fatty acid in the oil. The ester molecules which form as a result of this neutralization then polymerize to form the paint body. Alkyd paints in general have mild alkali resistance but excellent water resistance. They also have the ability to produce lighter colors and retain colors better than paints with natural drying oils.

Resin Emulsion Paints: Resin emulsion or latex paints are paints in which the vehicle is a synthetic resin emulsion, usually made from one of the four basic resin types: butadiene - styrene, polyvinyl acetate, epoxy resin or acrylic resin. The body of these paints is usually titanium-dioxide or lithopone, and soyabean proteins are added to the formulations, using butadiene - styrene and polyvinyl acetate to increase consistency and stability. Preservatives must then be added to prevent the proteins from allowing the formation of microorganisms. Extenders such as china-clay may also be used. Pigments are more restricted than for oil paints because the emulsion is alkaline in nature. Pigments usually used include titanium white, lithopone, cadmium yellow, cadmium red, talc, mica, silica, lamp black, and some hydro-carbon colors. The thinner is water and to it must be added a dispersing agent to keep the pigment and other materials suspended in the emulsion. These emulsions based paints tend to foam, so a defoaming agent, usually tributyl phosphate, is added. Finally, methyl cellulose is added to improve the flow qualities of the paint.

Polyvinyl acetate emulsions produce a much tougher skin than the butadiene - styrene types and so can be used as exterior as well as interior paint. One of the most important applications is in exterior finishes for masonry and stucco. Neither of these types of paint can be applied to a glossy surface, and in addition both must be protected from freezing. Acrylic and epoxy-resin-emulsion paints require no oxidation to form a film and remain flexible after drying. They exhibit great resistance to weathering and no tendency to lose their adhesive qualities or color with age. They contain no protein and therefore are not subject to deterioration. However, they are costlier than other emulsion paints.

Metallic Paint: Metallic paint consists of a metallic pigment and a vehicle. The pigment is in the form of very fine flakes of aluminum, copper, bronze which may be used in a natural or synthetic varnish, a quick-drying lacquer, special bronzing lacquer, or bituminous based vehicles, depending on where the paint is to be used.

Spraying is the best method of applying metallic paints as it permits the spreading of a uniform film and encourages the deposition of the metallic flakes evenly.

Luminescent Paint: Luminescent paint is made by adding fluorescent and phosphorescent pigments to any one of drier free vehicles, including alkyd marine varnish, spirit varnish, or quick drying lacquers. Color may also be incorporated into luminous paints. Luminescent paints may be used in residential buildings to

produce special effects. They are used in hospitals, schools, factories, hotels, etc. because their unique quality helps provide maximum safety.

Cement Paint: This is a water dilatable paint in which cement acts as the principal binder. Water-proof pigments, fillers, accelerators and water repellents are also added and integrally mixed with the cement during manufacture. It is applied on brick and cement surfaces. It resists the penetration of moisture.

Synthetic Enamel Paint: This paint is made from a synthetic resin instead of the fossil gum. It is superior to the ordinary enamel paint in all respects. It dries quickly, leaves no smell and gives a durable finish. It is suitable for application on steel, wood and aluminum and is designed for interior as well as exterior exposure.

Distempers: They form a cheap, durable and easily applied interior finish on surfaces except on wood and metal, because their moisture- and thermal-induced movements are likely to cause flaking. There are three main types of distempers, such as:

Washable Oil-bound Distempers: These consist of an emulsion of drying oil or varnish often dispersed by glue with pigments like lithopone. These are fast to rub and fairly washable.

Washable Oil-free Distempers: These are similar to oil-bound distempers but have casein instead of oil as binder. These are a little more difficult to apply but are resistant to alkalis provided that only lime fast pigments have been used.

Soft or Non-Washable Distempers: These are made from casein and whiting and are used on ceilings. These are moderately fast to scrubbing but not to washing.

Varnishes: Varnishes constitute a group of more or less transparent liquids which are used to provide a protective surface coating in much the same way as paints do. At the same time, they allow the original surface to show but add a lustrous and glossy finish to it.

Varnishes also have the following components: body, vehicle, thinner and drier. They are divided into three groups depending on the type of material used to form the body:

- a. Natural resin varnishes
- b. Modified natural resin varnishes
- c. Synthetic resin varnishes

Natural Resin Varnishes: The body of this group of varnishes is made from natural resins obtained from certain trees. Some of the resins are exudations from living trees, while others are fossil resins which usually are superior in quality.

The best thinner for varnishes is turpentine, a distillate of gum obtained from a group of pine trees. It evaporates slowly and gives to varnish qualities like, easy brushing and flowing that no other solvent can give. It also aids oxidation of the drying oil by absorbing oxygen from air and passing it on to the oil. Mineral spirits, benzene and naphtha are also used as thinners. Driers used in varnishes are organic salts of various metals.

Modified Natural Resin Varnishes: This group of varnishes is made with a natural resin whose properties have been altered by chemical action. Common resin is heat-treated with glycerine to form an ester gum and this gum is used as the body for the varnish.

Synthetic Resin Varnishes: Synthetic resins are products that are produced by the plastics industry which include nitrocellulose, phenolics, amino resins, alkyd resins, a number of vinyl resins, polyethylene, polystyrene, silicone, acrylic resins and epoxy resins. Many varnishes made with plastic resins attain their greatest potential only when baked.

Enamels: When pigment is added to a varnish, it results in the formation of an enamel. Any type of varnish can be used, and the durability of the enamel depends to a large extent on the quality of the pigment. Since varnishes do not contain the opaque body material which paints do, enamels do not have high covering power. For best results, they require an opaque undercoat.

Stains: Stains are materials used to apply color to wood surfaces. They are intended to impart color without concealing or obscuring the grain and not to provide a protective coating. They may be used to accentuate the color contrast of a wood grain, to even up color differences or to imitate expensive wood colors on surfaces which lack desirable color or grain. There are a number of types of wood stains available, based on the kind of solvent used to dissolve the coloring matter: water soluble stains, spirit soluble stains, penetrating oil stains, non-grain raising stains, and pigment wiping stains

18.7 SUMMARY

A given building needs to be suitably finished with reference to a good appearance and satisfactory preservation. A wide range of materials in addition to paints, etc., are available for this purpose : stones, bricks, ceramic products, wood, gypsum; clay, concrete, boards of various types, paper, glass, coir, metals, cork, and variety of synthetic materials, etc.

For paving of surfaces one can use concrete, asphalt, stone, brick or cobble stones; and for roofing one can choose from materials like: shingles of various materials, tiles, slate.