Module -5

Plastering and Pointing : purpose, materials and methods of plastering and pointing, defects in plastering-Stucco plastering, lathe plastering
Damp proofing- causes, effects and methods.
Paints- Purpose, types, ingredients and defects, Preparation and applications of paints to new and old plastered surfaces, wooden and steel surfaces. **8 Hours**

Applying mortar coats on the surfaces of walls, columns, ceiling etc. to get smooth finish is termed as plastering. Mortar used for plastering may be lime mortar, cement mortar or lime-cement mortar. Lime mortar used shall have fat lime to sand ratio of 1: 3 or 1: 4. If hydraulic lime is used mix proportion (lime: sand) is 1 : 2. Cement mortar of 1: 4 or 1: 6 mix is very commonly used for plastering, richer mix being used for outer walls. To combine the cost effectiveness of lime mortar and good quality of cement mortar many use lime-cement mortar of proportion (cement : lime : sand) of 1 : 1 : 6 or 1 : 1 : 8 or 1 : 2 : 8.

The objectives of plastering are:
1. To conceal defective workmanship
2. To give smooth surface to avoid catching of dust
3. To give good appearance to structure
4. To protect the wall from rain water and other atmospheric agencies
5. To protect surfaces against vermit.

Requirement of good plaster are:
• It should adhere to the background easily.
• It should be hard and durable.
• It should prevent penetration by moisture.
• It should be cheap and economical.
• It should possess good workability.
• It should efficiently check entry or penetration of moisture from surface.

Materials for plastering:
Lime mortar is usually applied in 3 coats while cement mortar is applied in two or three coats for the stone and brick masonry. For concrete surfaces cement mortar may be applied in two or three coats. For concrete building blocks many times only one coat of cement mortar is applied.The first coat provides means of getting level surface. The final coat provides smooth surface. If three coats are used second coat is known as floating coat. The average thickness of first coat is 10 to 15 mm. Middle coat thickness is 6–8 mm. The final coat is just 2 to 3 mm thick. If single coat is used its thickness is kept between 6 to 12 mm. Such coats are used on concrete surfaces not exposed to rain. The mortar used for plastering work can be classified into three categories:
• **Lime mortar**: it consists of equal volume of lime and sand these two materials are carefully ground in mortar mill. Flat lime is recommended for plastering work.

a) Three-coat plaster :In the 3-coat plaster, the first coat is known as rendering coat second coat is known as floating coat and the third coat is known as setting coat or finishing coat.

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1. Application of rendering coat

The mortar is forcibly applied with mason's trowel and pressed well into joints and over the surface. The thickness of coat should be such as to cover all inequalities of the surface; normal thickness is 12 mm. This is allowed to slightly harden, and then scratched criss - cross with the edge of trowel (or with devil float); the spacing of scratches may be 10 cm. The surface is left to set at least for 7 days. During this period, the surface is cured by keeping it damp and then allowed to dry completely.

2. Application of floating coat

The rendering coat is cleaned off all dirt, dust and other loose mortar dropping. It is lightly wetted. Patches 15 cm x 15 cm or strips 10 cm wide are applied at suitable spacing's to act as gauges. The mortar is then thrown with mason's trowel, spread and rubbed to the required plain surface with wooden float. The surface so obtained should be true in all directions. In case of lime-sand plaster, the finishing coat is applied immediately. In the case of lime surkhi plaster, the floating coat is allowed to slightly set and then lightly beaten criss - cross with floats edge at close spacing of 4 cm. It is then cured to set completely for at least 10 days and then allowed to dry out completely. In either case, the thickness of coat varies from 6 to 9 mm.

3. *Application of finishing*

In the case of lime-sand mortar the finishing coat is applied immediately after the floating coat. The finishing coat consists of cream of lime (called neeru or plasters putty, having lime cream and sand in the ratio of 4:1) applied with steel trowel and rubbed and finished smooth. The rubbing is continued till it is quite dry. It is left for 1 day, and then curing is done for at least 7 days. In the case of lime-surkhi mortar, the finishing coat is applied 7 days after the floating coat, after cleaning the surface of all dirt, dust and mortar droppings and after fully wetting the surface of previous coat. The finishing coat is rubbed hard and finished smooth.

b) Two-coat plaster

In the case of two-coat plaster, the rendering coat is a combination of the rendering floating coats of three-coat plaster and is done under one continuous operation exc6pt that the scratching of rendering coat, as specified in the three-coat plaster, is not done- The total thickness may be about 12 mm. The finishing is then applied in a manner similar to the three-coat plaster.

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2. CEMENT PLASTER AND CEMENT LIME PLASTER :Cement plaster is applied either in two coats or in three coats, the former being more common. For interior work, single coat plaster is sometimes provided.

a) Two-coat plaster. The following procedure is adopted:

1. The background is prepared by racking the joint to a depth of 20mm, cleaning the surface and well-watering it.

2. If the surface to be plastered is very uneven, a preliminary coat is applied to fill up the hollows, before the first coat

3. The first coat or rendering coat of plaster is applied, the thickness being equal the specified thickness of plaster less 2 to 3 mm. In order to maintain uniform thickness of plaster, screeds are formed of plaster on

Wall surface by fixing dots of 15cm x 15 cm size. Two dots are so formed in vertical line, at a distance of about

2m, and are plumbed by means of a plumb bob. A vertical strip of mortar known as screed, is then formed. A number of such vertical screeds are formed at suitable spacing. Cement mortar is then applied on the surface between the successive screeds and the surface is properly finished.

4. Before rendering hardens, it is suitably worked to provide mechanical key for the final or finishing coat. The rendering coat is trowelled hard forcing mortar into joints and over the surface. The rendering coat is kept wet for at least 2 days and then allowed to dry completely.

5. The thickness of final or finishing coat may vary between 2 and 3 mm. Before applying the final coat, the rendering coat is damped evenly. The final coat is applied with wooden floats to a true even surface and finished with steel trowels. As far as possible, the finishing coat should be applied starting from top towards bottom and completed in one operation to eliminate joining marks.

(b) *Three-coat Plaster.*

The procedure for applying three-coat plaster is similar to the two-coat plaster except that an intermediate coat, known as floating coat is applied. The purpose of this coat of plaster is to bring the plaster to an even surface. The thickness of rendering coat, floating coat and finishing coat are kept 9 to 10 mm, 6 to 9 mm and 2- 3 mm resp. The rendering coat is made rough. The floating coat is applied about 4 to 7 days after applying the first coat.

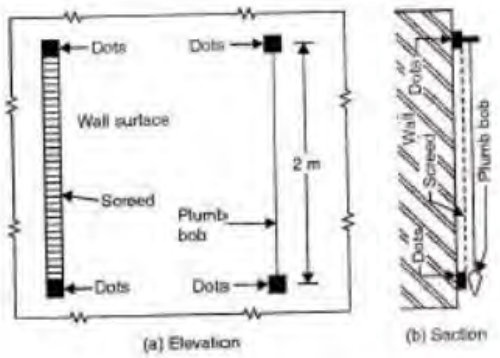

FIG. 19.2. DOTS AND SCREEDS.

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(c) *single-coat plaster*.

This is used only in inferior quality work, It is applied similarly as two coat plaster except that the rendering coat, as applied for two-coat plaster, is finished off immediately after it has sufficiently hardened'

• **Cement mortar**: the cement mortar consists of one part of cement to four part of clean, coarse and angular river sand. The materials are thoroughly mixed in dry condition before water is added to them. The mixing of materials is done on a watertight platform.

• **Water proof mortar**: This mortar is water proof and it is prepared by mixing one part of cement and two parts of sand and pulverised alum at the rate of 120 N per m3 sand.

Method of Plastering:

The plastering could be done on the surfaces either in one, two and three coats. The plasterings for two coats are as follows:

• The mortar joints are racked out to a depth of 20 mm and surface is cleaned and well watered. If it is found that the surface to be plastered is very rough and uneven, a primary coat is applied to fill up the hollows before the first coat of plaster is put on the surface.

• The first coat of plaster is now applied on the surface. The usual thickness of first coat for brick masonry is 9 mm to 10 mm. In order to maintain uniform thickness, the screeds are formed on the wall surface by fixing dots.

• The cement mortar is placed between successive screeds and surface is properly finished. The second coat is applied after six hours and thickness of second coat is 3 mm to 2 mm. The completed work is allowed to rest for 24 hours and then, the surface is kept well watered for rest of week.

For plastering in three coats are similar to two coats. The thickness of first coat (rendering coat) 9 to 10 mm, second coat (rendering coat) 9 to 10 mm, and third coat (setting coat) thickness around 3 mm.

The techniques for plastering various surfaces:

• Internal Plastering on surfaces of Brick and Concrete:

Initially, the Surface where plastering is to be done will be cleaned. Level pegs on walls will be fixed with reference to the off lines to brick walls set out in floors. (Using centre plumb bob and nylon thread). All the brick walls will be watered before pasting mortar on walls. First coat mortar filling (1:4 Cement and Sand) up to 15 mm will be applied on surfaces where required mortar thickness exceed 25mm. Walls and columns will be plastered 1:4 Cement and Sand to achieve semi rough finished surface. Vertical joint of structural columns / walls & brick walls will be treated by fixing 200mm width chicken mesh with wire nails / concrete nails by centering the mesh to the vertical wall joint. All the embedded service lines and provisions (Conduits, Boxes and etc.) will be completed on brick walls and check with the MEP drawings. Joints between walls and beams will be formed up to a maximum of 20mm and will be sealed using 30 minutes fire rated flexible filler. (Material descriptions will be submitted for the approval of the Engineer) Internal plastering on surfaces of concrete columns, beams & walls which are aligned with surfaces of brick walls will be plastered and other concrete surfaces will be finished with cement base easy plaster. (Material descriptions will be submitted for the approval of the Engineer).

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External Wall Plastering:

Alignment and fixing level pegs on external wall surfaces will be done using the surveying instrument / centre plumb bobs. Projections on the wall surfaces will be chipped off and cleaned after completing the level pegs on walls. First coat mortar filling (1:4 Cement and Sand) up to 15 mm will be applied on surfaces where required mortar thickness exceed 25mm.Cement paste on concrete surfaces will be applied to improve the bonding of plaster to the concrete surfaces. Maximum width of 20mm horizontal grooves between walls and beams will be formed by cutting using grinders with diamond wheels after plastering the wall surface. This groove will be filled with approved weather sealant. External wall plaster will be finished with rough surface. 1:10 slope at the external side of the window sill will be formed while plastering the window reveals.

• **Soffit Plastering / Soffit Finishing with Cement Based Easy Plaster**

The slab soffits and beams' sides and soffits which are to be smooth surfaced painted finished will be smoothen with easy plaster (Material literature will be submitted separately) and places where concrete surfaces are uneven, will be roughen & leveled with cement and sand mortar plaster before applying easy plaster to make surface smooth.

• **Improving Joints of Brick Wall & Structural Concrete**

• 200mm wide Chicken Mesh will be fixed at the joint.

• Concrete surfaces will be washed and cleaned.

• Concrete surface which are to be plastered will be roughen or put spot cement slurry.

Different plastering techniques:

• There are numerous plastering techniques used to plaster ceilings and walls. It all depends on the requirements of the client as well as the nature of the area that needs plastering. Let’s take a look at some general plastering techniques:

Dry Lining Plastering

• Over the years, traditional Melbourne homes made use of wet plastering to ensure a smooth finish to ceilings and walls. During the last 3 to 4 decades, dry plastering or dry lining plastering techniques are being used instead. This method is favoured due to the ease of using a plasterboard. After all, plasterboards are solid and available in sheet form in standard sizes of around 2.4 x 1.2 meters. Plasterers Melbourne found it a breeze to handle and put plaster on. What is more, dry lining is a complete dry procedure which allow plasterers to quickly fix any mishaps. Paint can easily be applied to any surface to ensure a warm and welcoming finish.

• The biggest reason why most builders or plasterers prefer using dry lining is due to the speed of applying it and the load being reduced on structures of any kind. As plasterboard walls are lightweight, they offer better flexibility when it comes to planning interior or exterior spaces on the drawing board. In addition, dry lining is a plastering technique that saves you money and time. Yet another reason why it is the most preferred plastering method as far a construction work in timber frames are concerned.

Wet Plastering

• Known to be the most common of all plastering techniques used is wet plastering. It enables experiences plasterers Melbourne to obtain a clean and smooth finish by covering any surface in need of plastering with mortar, then smoothening it using trowels. Dried wet plastered surfaces can be painted or papered according to individual preferences. Like most plastering techniques, it

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requires skilled plasterers and enough drying time. Wet plastering is prone to shrinkage, cracks, and often times in need of re-plastering in order to cover any cracks.

Defects in Plastering

The following defects may arise in plaster work.

1. **Blistering of plastered surface:** This is the formation of small patches of plaster swelling out beyond the plastered surface, arising out of late slaking of lime particles in the plater

2. **Cracking:** Cracking consists of formation of cracks or fissures in the plaster work resultin gfrom the following reasons. i. Imperfect preparation of background

ii. Structural defects in building

iii. Discontinuity of surface

iv. Movements in the background due to its thermal expansion or rapid drying

v. Movements in the plaster surface itself, either due to expansion or shrinkage.

vi. Excessive shrinkage due to application of thich coat

vii. Faulty workmanship.

3. **Efforescene:** It is the whitish crystalline substance which appears on the surface due to presence of salts in plaster making materials as well as building materials like bricks, sand, cement etc and even water. This gives a very bad appearance. It affects the adhesion of paint with wall surface. Efforescene can be removed to some extent by dry bushing and washing the surface repeatedly.

4. **Flaking:**It is the formation of very loose mass of pastered surface, due to poor bond between sucessive coats.

5. **Peeling:** It is the complete dislocation of some portion of plastered surface, resulting in the formation of a patch. This also results from imperfect bond.

6. **Popping:** It is the formation of conical hole in the plastered surface due to presence of some particles which expand on setting

7. **Rust Stains:** These are sometimes formed when plaster is applied on metal laths

8. **Uneven surface:** This is obtained purely due to poor workman ship.

Materials of Plastering:

Special materials are used in plastering or over the plastered surface to meet some specific requirements of the finished surface, such as increased durability, better or attractive appearance, fire proofing, heat insulation, sound insulation etc.,

Following are the usual special materials used for plastered surfaces.

1. *Acoustic plaster*.

This contains gypsum mixtures applied as final coat in finishing the plastered surface. Such a coat undergoes chemical reaction resulting in production of gas bubbles and consequent formation of tiny openings in the coat. These honey-combed minute openings absorb sound. Such plaster is useful in

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the interior walls of halls, auditoriums etc., The plaster is applied in two coats each of 6 mm thickness, using wooden float.

2. Asbestos marble plaster.

This plaster is made of cement, asbestos and finely crushed marble, imparting marble like finish.

3. *Barium plaster.*

It is made from cement, sand and barium sulphate, and is provided in X-ray rooms, to protect the persons working in it.

4. Granite silicon plaster.

This plaster is used for superior type of construction since it is quick setting & possess highly elastic properties which eliminate cracks.

5. *Gypsum plaster*

(plaster of Paris) Plaster of Paris is obtained from heating finely ground gypsum heated at 160 to 170 degree centigrade. It hardens within 3 to 4 minutes of adding water. To extend the setting time, suitable retarders are used. Plaster of Paris is generally used in combination with lime, for ornamental work, and for repairing holes and cracks.

6. Kenee's cement plaster.

Kenee's cement is obtained by the calcination plaster of Paris with alum. This is very hard and sets in few days, taking white, glass-Like polish. It is used for situations such as angles, skirting's etc., Because of its polishing characteristics, it is also useful for ornamental work and decorative plastering.

7. Martins cement plaster.

Martin's cement is obtained when pearl ash is calcined with Plaster of Paris. It has quick setting properties, and forms a white hard surface on drying. It is used for internal finishing work

8. parian cement plaster.

Parian cement is obtained when borax is calcined with Plaster of Paris. Like Kenee's cement, it is also used for interior work. However it is cheaper than Kenee's cement'

9. Scagliola plaster.

Scagliola is obtained by dissolving Kenee's cement and coloring pigments in glue. It is used for plastering pilasters, panels, columns etc., It appears like marble.

10. *Sirapite plaster*.

Sirapite is obtained when plaster of Paris is slaked in petroleum. It is quick setting and fire resisting. It produces white hard surface on drying.

11. Snowcrete and colourcrete cements.

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These are the trade names given to white and coloured cement respectively. These are used on external walls to create good appearance.

12. Thistle hard wall.

It is a product of high grade gypsum. It sets rapidly and produces excellent finish. It is used for interior work.

The term **Pointing** in construction is applied to the finishing of mortar joints in masonry (stone or brick). In exposed masonry, joints are considered to be the weakest and most vulnerable spots from which rain water or dampness can enter. Pointing means implementing the joints to a depth of 10 to 20mm and filling it with better quality mortar in desired shape.

Mortar required for pointing work:

1. Lime mortar of 1:2 (1 fat lime : 2 sand or surkhi)
2. Cement mortar of 1:3 (1 cement : 3 sand)

Above mortar mixes will give good results in pointing.

Preparation of surface:

All the joints in masonry are raked down to a depth of 20mm while the mortar is still soft. The joints and surface are cleaned and then thoroughly wetted.

Methods of pointing:

After preparing the surface as mentioned above, mortar is carefully placed in joints using a small trowel. The placed mortar should be of desired shape. Whenever the fresh mortar is placed in the joints it should be pressed hardly to gain strong bond with old interior mortar. Care should be taken while using ashlar or 1st class brick work otherwise the mortar does not cover the face edges. The pointed surface is kept wet for at least a week or till it sets after application.

Types of pointing:

1. Flush pointing
2. Recessed pointing
3. Beaded Pointing
4. Struck Pointing
5. Rubbed, keyed or grooved pointing
6. Tuck Pointing
7. V- pointing
8. Weathered pointing

Flush pointing:

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In This type of pointing mortar is pressed hard in the raked joints and by finishing off flush with the edge of masonry units. The edges are neatly trimmed with trowel and straight edge. It does not give good appearance. But, flush pointing is more durable because of resisting the provision of space for dust, water etc., due to this reason, flush pointing is extensively used.

Recessed pointing:

In case of recessed pointing mortar is pressing back by 5mm or more from the edges. During placing of mortar the face of the pointing is kept vertical, by a suitable tool. This type of pointing gives very good appearance.

Beaded pointing:

It is a special type of pointing which is formed by a steel or ironed with a concave edge. It gives good appearance, but it will damage easily when compared to other types

Struck pointing:

This is a modification of flush pointing in which the face the pointing is kept inclined, with its upper edge pressed inside the face by 10mm. struck pointing drains water easily.

Rubbed, keyed or grooved pointing:

This pointing is also a modification of flush pointing in which groove is formed at its mid height, by a pointing tool. It gives good appearance.

Tuck pointing:

In case of tuck pointing mortar is pressed in the racked joint first and finishing flush with the face. While the pressed mortar is green, groove or narrow channel is cut in the center of groove which is having 5mm width and 3mm depth. This groove is then filled with white cement putty, kept projecting beyond the face of the joint by 3 mm. if projection is done in mortar, it is called bastard pointing or half tuck pointing.

V- Pointing:

This pointing is formed by forming V-groove in the flush-finishing face.

Weathered pointing:

This pointing is made by making a projection in the form of V-shape

Damp prevention is a chief requirement to ensure safety of building against dampness.
One of the basic requirements in all the buildings is that structure should be dry as far as possible.
If this is not satisfied it is likely that building may become inhabitable and unsafe from structural point of view.

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In order to prevent entry of damp into a building the courses known as damp proofing courses are provided at various levels of entry of damp into a building.
Presently all buildings are given DPC treatment
So DPC prevent entry of moisture from walls floors and basements of a buildings

The treatment given to roofs of buildings for some cause is called water proofing.

Cause Of Dampness

Responsible causes are one or more of the followings
1. Faulty design of structure

2. Faulty construction / poor workmanship

3. Use of poor quality of material in construction

These causes give rise to an easy access to moisture to the building from different points, such as rain penetration through walls, roofs and floors etc. The moisture entering into the buildings from foundation and roofs travels in different directions further under the effect of capillary action and gravity respectively. The entry of water and its movement in different parts of the buildings are positively due to one or more of the causes listed above
(1) Rising Of Moisture From The Ground

The subsoil or ground on which the building is constructed may be made of soils which easily give an access to water to create dampness in building. Generally the foundation dampness is caused when the building structures are constructed on low lying water logged areas where a sub soil of clay or peat is commonly found through which dampness will easily rise under capillary action unless properly treated.

This dampness further finds its way to the floors, walls etc. through the plinth.

(2) Action Of Rain Water
Whenever the faces of walls are not suitably protected from the exposer to heavy shower of rains, they become the sources of dampness in a structure. Similarly the poor mortar joints in walls and cracked roofs also allow dampness to enter the building structure. Sometimes due to faulty eave courses and eave gutters, the rain water may percolate through the roof coverings

(3) Rain Penetration From Top Of The Wall
All parapet walls and compound walls of the buildings which have not been protected from rain penetration by using dam proof courses or by such measures on their exposed tops are subjected to dampness. This dampness in the buildings is of serious nature and may results in unhealthy living condition or even in structurally unsafe conditions.

(4) Condensation Due To Atmospheric Moisture Whenever the warm air in the atmosphere is cooled it gives rise to process of condensation. On account of condensation the moisture is deposited on the whole area of walls, floors, and ceilings. However the sources of dampness is prevalent only in certain places in India, where very cold climate exist.

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(5) Miscellaneous Sourses Or Causes

The various other sources responsible for dampness in buildings are mentioned bellow:-

(a) Poor Drainage Of Site

The structure if located on low lying site causes water logged conditions where impervious soil is present underneath the foundation.

So such structures which are not well drained cause dampness in buildings through the foundations.

(b) Imperfect Orientation

Whenever the orientation of the buildings is not proper or geographical conditions are such that the walls of buildings get less of direct sunrays and more of heavy showers of rains, then such walls become prone to dampness.

(c) Constructional Dampness

If more water has been introduced during construction or due to poor workmanship, the walls are observed to remain in damp condition for sufficient time.

(d) Dampness Due To Defective Construction

Dampness in buildings is also caused due to poor workmanship or methods of construction viz inadequate roof slopes, defective rain water pipe connection, defective joints in roofs in proper connection of walls etc.

Effect Of Dampness

The various effects (indirectly defects), caused due to dampness in buildings are mentioned below

All effects mainly result in poor functional performance, ugly appearance and structural weakness of the buildings.

(a) A damp building creates unhealthy living and working conditions for occupants.

(b) Presence of damp conditions causes efflorescence on building surface, which ultimately may result in the dis-integration of bricks, stones, tiles etc. and hence in the reduction of strength.

(c) It may cause bleaching and flaking of the paint which results in the formation of coloured patches on the wall surfaces and ceilings.

(d) It may result in corrosion of metals used in the construction of buildings.

(e) The material used as floor coverings, such as tiles, are damaged because they lose adhesion with the floor base.

(f) Timber, when in contact with damp conditions, gets deteriorated due to the effects of warping, buckilng and rolling of timber.

(g) All electrical fittings get deteriorated, causing leakage of electric current with the potential danger of a short circuit.

(h) Dampness promotes the growth of termites and hence creates unhygienic conditions in buildings.

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(i) Dampness when accompanied by the warmth and darkness, breeds the germs of tuberculosis, neuralgia, acute and chronic rheumatism etc.which sometimes result in fatal diseases.

Techniques And Methods Of Damp Prevention

The following precautions should be taken to prevent the dampness in buildings, before applying the various techniques and methods described later :

(I) The site should be located on a high ground and well drained soil to safeguard against foundation dampness. It should be ensured that the water level is at least 3m. below the surface of ground or lowest point even in the wet season. For better drainage the ground surface surrounding th building should also slope away.

(II) All the exposed walls should be of sufficient thickness to safe guard against rain penetration. If walls are of bricks they should be at least 30 cm thickness

(III) Bricks of superior quality which are free from defects such as cracks, flaws, lump of lime stones should be used. They should not absorb water more than 1/8 of their own weight when soaked in water for 24 hours.

(IV) Good quality cement mortars should be used to produce a definite pattern and perfect bond in building units throughout the construction work. This is essential to prevent the formation cavities and occurrence of differential settlement.

(V) Cornices and string courses should be provided. Window sills, coping of plinth and string courses should be slopped on top and throated on the undesirable to throw the rain water away from walls.

(VI) All the exposed surfaces should be covered with waterproofing cement plaster

(VII) Hollow walls are more reliable than solid walls in preventing dampness and hence the cavity wall construction should be adopted wherever possible.

Prevention of dampness

Use of damp proofing courses or membranes-

These are the layers or membranes of water repellent material such as bituminous felts, mastic asphalts, plastic sheets, cement concrete, mortar, metal sheets which are interposed in the building structure at all location wherever water entry is anticipated. These damp proof courses of suitable materials should be provided at appropriate location for their effective use. Basically D.P.C is provided to prevent the water rising from the sub soil and getting into the different part of the buildings. The best location for D.P.C in case of buildings without basement lies at the plinth level or in case of structure without plinth should be laid at least 15 cm above the ground. These damp proof courses may be provide horizontally or vertically in floors, walls etc. in case of basement laying of D.P.C is known as tanking.

While providing damp-proof courses in buildings, the following general principles should be observed in practice.

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• The DPC should cover the full thickness of the walls excluding rendering, in order to act as an effective barrier to moisture under all conditions.

• The mortar bed upon which the DPC is laid should be level, even and free from any projections.

• The DPC course should be placed in correct relation with other DPC courses so as to provide a complete course should be placed in correct relation with other DPC courses so as to provide a complete and continuous barrrier to the passage of moisture from below, top or sides. Therefore, the junctions and corners, formed by walls, or walls and floors, should be laid continuous.

• Where a vertical DPC is to be laid continuous with a horizontal DPC(i.e., forming angle projection), a fillet 75mm in radidius should be provided. the DPC should not be exposed on the wall surface, otherwise it is likely to be damaged by carpainters, tile layers,etc.

(2) Waterproof (or damp proof) surface treatment

The surface treatment consists in filling of the pores of the material exposed to moisture by providing a thin film of water repellent material over the surface. These surface treatments can be either external or internal, the external treatment is effective in preventing dampness where as internal one only reduces it to a certain extent.

Many surface treatments like pointing, plastering. Painting, distempering, are given to the exposed surfaces and also to the internal surfaces. Most commonly used treatments, to protect the walls against dampness, is lime cement plaster of mix (one cement : one lime : six sand) proportions. A thin film of water proofing can be materials, generally employed as waterproofing agent in surface treatments are : sodium or potassium silicates, aluminium or zinc sulphates, barium hydroxide and magnesium sulphate in alternate applications, soft soap and alum also in alternate applications, lime and linseed oil, coal tar, bitumen, waxes and fats, resins, and gum, etc.

Some of the abve mentioned materials, like the waxes and fats, are unsuitable in the tropics as they melt with rise in temperature, resins and gums and also not lasting materials are coal tar and bitumen disfigure the original surface.

(3) Integral damp-proofing treatment

The integral treatment consists adding certain compounds to the concrete or mortar during the process of mixing, which when used in construction act as barriers to moisture penetration under different principles. Compounds like chalk, talc, fuller's earth, etc.have mechanical action principle, i.e., they fill the pores present in the concrete or mortar and make them denser and water proof. The compounds, like alkaline, silicates, aluminium sulphates, calcium chlorides,etc.work on chemical action principle i.e., they react chemically and fill in the pores to act as water resistant. Similarly , some compounds like soaps, petroleum oils, fatty acid compounds such as stearates of calcium,sodium ammonium

etc.work on repulsion principle i.e., they are used as admixtures in concrete to react with it and become water repellent.

The synthetic compound prepared under this principles are available in commercial forms, like Pudlo, Sika, Novoid, Ironite, Dampro, Permo Rainers,etc.

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(4) cavity walls

A cavity wall consist of two parallel walls/leaves/skins of masonry, separated by a continuous air space/cavity.

They consists of three parts.

• Out wall/leaf(exterior wall part 10cm thick)
• Cavity/air space(5cm-8cm)
• Inner wall/leaf(minimum 10cm thick)

The two leaves forming a cavity in between may be of equal thickness or may not be. The inner wall thickness may more to take larger properties of imposed loads transmitted by floor and roof.

Provision of continuous cavity in the wall efficiently prevents the transmission of dampness from outer to inner wall.

Under climatic conditions of India (hot-dry/hot-humid), cavity type construction is most desirable as it offers many advantages such as better living and comfort conditions, economic construction and preservation of buildings against dampness.

1. As there is no contact between outer and inner walls of a cavity wall except at wall ties, which are of impervious material, so possibility of moisture penetration is reduced to a minimum.
2. It has been verified a cavity wall of 10cm thick internal and external walls with 5cm cavity/air space in between is better or more reliable than solid wall of 20cm thickness w.r.t damp prevention.
3. The cavity wall offers good insulation against sound.
4. It reduces the nuisance of efflorescence.
5. It offers other advantages like,

• Economy
• Better comfort
• Hygienic conditions in buildings.

(5) Shot concrete(gunting)

This consists in forming an impervious layer of rich cement mortar(1:3) for water proofing over the exposed concrete surface or over the pipes, cisterns, etc. for resisting water pressure. Gunite is a mixture of cement and sand on well graded fine aggregate, the usual proportion being 1:3 or1:4. A machine known as cement gun, having a nozzle for spraying the mixture and a drum of compressed air for forcing the mixture under desired pressure, is used for this purpose, Any surface which is to be treated is first thoroughly cleaned of any dirt, greese or loose particles and then fully wetted. The mix of cement and sand is then shot under a pressure of 2-3kg/sq.cm by holding the nozzle of cement gun at a distance of 75-99 cm from wall surface. The necessary quality of water is added by means of regulating valve soon after the mixture comes out from cement gun. So mix of desired consistency and thickness can be sprayed, to get an impervious layer, the impervious surface should be watered for about 10 days.

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By this technique impervious layer of high compressive strength can be obtained (28 days strength) and so it is useful method for reconditioning/repairing old concrete works, bricks and masonry works, which have deteriorated.

(6) Pressure grouts (cementation)

Cementation is the process of forcing the cement grout (mix of cement, sand, water) under pressure into cracks, voids, fitters present in structural components/ground. All the components of a structure in general and foundation, which are liable to moisture penetration are consolidated and so made water resistant by this process.

Here heels are drilled at selected points in structure and cement grout of sufficiently thin consistency is forced under pressure to ensure complete penetration onto cracks. This makes structure water tight and restores stability and strength.

When structure is resting on hard but loose textured ground its strength can be increased, by this process. This technique is used for repairing structures, consolidator ground to improve bearing capacity forming water cut offs to prevent seepage.

Materials used for damp proofing

1. An effective damp proofing materials should have the following properties.

2. It should be impervious

3. It should be strong and durable and should be capable of withstanding both dead or wet or live load without damage.

4. It should be dimensionally stable.

5. It should be free from deliquescent salts like sulphates, chlorides and nitrates.

Introduction to painting:

Paints are the liquid composition of pigments and binders which when applied to the surface in thin coats, dry to form a solid film to impart the surface a decorative finish apart from giving protection to the base material.

Characteristics of good paint:

An ideal paint should possess the following characteristics

(1) Paint should form hard and durable surface.
(2) IL should give attractive appearance.
(3) It should be cheap and readily available.
(4) It should be such that it can be applied easily to the surfaces.
(5) It should have good spreading quality, so as to cover maximum area in minimum quantity.
(6) It should dry in reasonable time.
(7) It should not show hair cracks on drying.
(8) It should form film of uniform colour, on drying.
(9) It should be stable for a longer period.
(10) It should not be affected by atmospheric agencies.

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Constituents of paints:

A paint generally is made up of the following constituents

1. A base.
2. Inert filler or extender
3. Colouring pigment
4. Vehicle
5. solvent or thinner
6. Drier

1. Base

It is generally a metallic oxide and is used in a paint. Base is an essential pigment which forms the chief ingredient of a paint. The most important purpose of adding a base in a paint is to form an opaque coating to hide the surface to be painted. It also makes the paint film resistant to abrasion and prevents shrinkage crack likely to be formed in the film during drying cement, white lead, red lead, zinc oxide, ferrous oxide are the bases commonly used.

2. Inert filler or extender

It is the cheap pigment which is added to a paint to reduce its cost. In addition it modifies the weight of the paint and makes it more durable. The commonly used inert filler are $BaSo4$, silica, gypsum, charcoal, etc.,

3. Colouring pigment

As the name indicates it is white or coloured pigment mixed into a paint to get desired colour of a paint.

4. Vehicle

It is a liquid which acts as a binder for the various pigments like base extender and colouring pigment. The vehicle makes the paint in the state of fluid and thus helps to spread the ingredients present in the paint uniformly over the surface to be painted. This forms a surface resistant to abrasion and also impermeable film on drying.

Refined linseed oil is commonly used vehicle in the case of oil paint, soyabean, sunflower, tobacco, etc., are also being used as vehicle in various combination with or without linseed oil.

5. Solvent / thinner

It is a liquid which thins the consistency of the paint and evaporates after the paint has applied to the surface. It imparts smoothness and easy flow of paint.

Turpentine, pure oil, petroleum spirit are commonly used as solvent or thinner

6. Drier

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These are the materials containing metallic compounds and are used in small quantities for accelerating the drying of a paint. The driers should not be used in excess (not more than 10% of volume) if used in excess they tend to destroy the elasticity of the paint which finally leads to its flaking. Lead acetate, Mno2, cobalt are the commonly used driers.

Types of paints:

1. Aluminium paint: It consists of finely ground aluminium suspended in either quick-drying spirit varnish or slow drying oil varnish as per actual requirements. A thin metallic film of aluminium is formed When the spirit or oil evaporates. It is used for painting wood work or metal surfaces.

2. Anticorrosive paint: this paint is generally used as a metal protection paint for preserving structural steel work against the adverse effect of acid etc.,

3. Asbestos paint: this type of paint is especially suitable for patch work or stopping leakage of metal roof. It is also used for painting gutters in order to prevent rusting. Asbestos paint is sometimes used as damp proof cover for the outer surface of the wall

4. Bituminous paint: these are alkali resistant and it is used for painting exterior brick work and plastered surfaces, they are also used for water proofing and protection of iron and steel work which are under water. These paints get deteriorated when exposed to direct sunlight.

5. Bronze paint: this type of paint is often used for painting interior or exterior metallic surface on amount of its high reflective property it is commonly applied on radiators

6. Cellulose paint: this type of paint is made from celluloid sheet, it dries very quickly and possess additional advantage of hardening, flexibility and smoothness. It can be cleaned very easily and remain unaffected by hot water or acidic atmosphere, it is much superior to ordinary house paint and also very expensive. On amount of its high cost its usage is generally restricted for painting to motor cars, aero planes, etc.,

7. Casein paint: Casein is a protein substance extracted from milk curd which is mixed up with the base consisting of white pigment like titanium to form the paint, it is usually applied on walls, ceiling, cement blocks, etc., to enhance the appearance of the substance.

8. Cement based paint: this is a type of water paint in which cement farms the base. No oil or other organic matter is used in making this paint. This type of paint I available in packed powder form under different names (snow cem). This paint can be made by adding paint powder to water to obtain thick paste and thereafter diluting the paste with water to brush able consistence. This paint has to be used within one hour after mixing since the paint gets spoiled due to the settling of cement.

9. Enamel paint: it is made of adding pigments like white lead to a vehicle, here the vehicle is varnished. This paint can be used for interiors as well as exterior surface. They are not affected to any atmospheric changes

10. Oil paint: This type of paint can be used for almost all surfaces such as wooden, masonry, metal, etc.,

11. Rubber based paint: this type of paint has an excellent acid, alkali and water resistant property, it can be readily used for application on new concrete and lime plastered surface .

Defects in Painting:

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The following defects may occur in painting work:

1. *Blistering*. It is the defect caused due to the formation of bubbles under the film of paint. The bubbles are formed by water vapors trapped behind the painted surface.

2. *Bloom*. In this defect, dull patches are formed on finished polished surface- This may be either due to defect paint or due to bad ventilation.

3. *Crawling or sagging*. This defect occurs due to the application of too thick a paint.

4. *Fading*. This is the gradual loss of colour of paint, due to the effect d sunlight on pigments of the paint.

5. *Flaking.* Flaking is the dislocation or loosening of some portion of the painted surface, resulting from poor adhesion

6. *Flashing.* It is the formation of glossy patches on the painted surface, resulting from bad workmanship, cheap paint or weather action.

7. *Grinning.* This defect is caused when the final coat does not have sufficient opacity so that background is clearly seen.

8. *Running*. This defect occurs when the surface to be painted is too smooth. Due to this, the paint runs back and leaves small areas of the surface uncovered.

9. *Sponification.* This is the formation of soap patches on the painted surface due to chemical action of alkalies.

Application of paints to new and old surfaces:

Repainting old work:

Before repainting old work, the old paint having cracks and blisters should be removed, by applying any one of the following solvents or paint removers:

1. Applying solution containing 1kg of caustic soda in 5 litres of water. The paint gets dissolved.

2. Applying mixture containing one part of soft soap, two parts of potash and one part of quick lime, while in hot state. After 24hs of the application, surface is washed with hot water.

3. Applying mixture of equal parts of washing soda and quicklime to the required consistency. After 1 hour or application, the surface is washed with water.

After removing the old paint, the surface is properly cleaned and then rubbed with pumice stone or glass paper. The cleaned surface is given two or three coats of paint to obtain the desired finish.

PAINTING NEW IRON AND STEEL WORK

Iron and steel surfaces are painted so that rusting is prevented. Hence surface should be prepared very carefully

1. The surface is cleaned off scale and rust etc. by scrapping or brushing with steel wire brushes. Oil, grease, etc., is removed by washing the surface with petrol, benzene or lime water.

2. The cleaned surface is treated with a film of phosphoric acid. This film protects the surface from rusting and provides better adhesive surface for the paint.

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3. First coat is then applied with a brush. The coat consists of dissolving 3 kg of red lead in 1 litre of boiled linseed oil.

4. After prime coat dry. Two or three under coats are applied either with a brush or with spray gun. Each coat has to be applied only after previous coat gets completely dried. Under coat may consists of 3kg of red oxide, dissolved in 5liters of boiled linseed oil.

5. After the undercoat has dried, the final coat of the desired type of paint is applied. Finishing coat should present smooth finish.

Repainting old iron and steel work:

Before repainting, the old surface is thoroughly cleaned by application of soap water. The grease, if any, may be removed by washing the surface with lime and water. However if the old paint has cracked, it has to be removed by flame – cleaning. A flat oxy-acetylene flame is passed over the metal, burning off the old paint and loosening rust and scale, the surface is then scrapped with wire brush and washed with solution of caustic soda and fresh slaked lime. After the surface is thus prepared, painting is carried out as for the new surface.

Outcomes
Able to study the plastering in detail
Able to study the paints in details
Will be able to know the defects in plastering

Future Study
http://nptel.ac.in/syllabus/105102088/

Text Books:

1. Sushil Kumar "Building Materials and construction", 20th edition, reprint 2015,Standard Publishers
2. Dr. B.C.Punmia, Ashok kumar Jain, Arun Kumar Jain, "Building Construction, Laxmi Publications (P) ltd., New Delhi.
3. Rangawala S. C. "Engineering Materials", Charter Publishing House, Anand, India.

Reference Books:

1. S.K.Duggal, "Building Materials", (Fourth Edition)New Age International (P) Limited, 2016 National Building Code(NBC) of India
2. P C Vergese, "Buliding Materials", PHI Learning Pvt. Ltd
3. Building Materials and Components, CBRI, 1990, India
4. Jagadish.K.S, "Alternative Building Materials Technology", New Age International, 2007.
5. M. S. Shetty, "Concrete Technology", S. Chand & Co. New Delhi.

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BUILDING MATERIALS AND CONSTRUCTION

MODULE WISE QUESTIONS

MODULE 1

1. List any four commonly used building stones and state their suitability in construction. (Dec.2013/Jan.2014)
2. Write the requirements of good building stones. (Dec.2016/Jan.2017)
3. Explain the factors causing deterioration of stonework and preservation of stonework. (Dec.2016/Jan2017)
4. Briefly explain the tests conducted on bricks. (Dec.2016/Jan.2017)
5. Write the requirements of good mortar. (Dec.2016/Jan.2017)
6. Briefly explain the tests conducted on fine aggregates. (a) Sieve analysis. (b) Specific gravity test. (Dec.2016/Jan.2017)
7. Mention the qualities of good bricks. (June 2012)
8. List any four commonly used building stones and state their suitability in construction. (Dec.2013/Jan2.2014)
9. Explain physical and chemical classification of rocks. (Dec.2018/Jan.2019)
10. List and explain laboratory tests on bricks. (Dec.2018/Jan.2019)
11. Explain bulking of sand. (Dec.2018/Jan.2019)
12. Which are the constituents of good brick earth? Explain. (Dec.2018/Jan.2019)
13. What is quarrying of stones? Explain methods of quarrying. (Dec.2018/Jan.2019)
14. Explain the importance of shape, size and texture of coarse aggregates in cement concrete making. (Dec.2018/Jan.2019)
15. What are the requirements of good building stone? Explain the dressing of stones. (June/July2018)
16. List the various tests conducted on coarse aggregate. Explain any one of them in brief. (June/July2018)
17. Explain the different types of preservations commonly adopted in the preservation of stones. (June/July2018)
18. What are the requirements of good bricks and explain the field and laboratory tests on bricks. (June/July2018)

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MODULE 2

1. Explain the essential requirements of good foundation. (Dec.2013/Jan.2014)
2. What is the safe bearing capacity of a soil? Briefly explain various methods adopted to improve it. (Dec.2013/Jan.2014)
3. Draw neat labelled sketches of the following types of foundations and explain where they are adopted (a) raft foundation. (b) strap foundation. (Dec.2013/Jan.2014)
4. Explain any two of the following: (a) Reinforced brick work. (b) Partition walls. (c) Cavity walls. (Dec.2013/Jan.2014)
5. Draw neat sketches of the following and explain: (a) Ashlar masonry. (b) rubble masonry. (Dec.2013/Jan.2014)
6. Explain the essential requirements of good foundation. (Dec.2016/Jan2017)
7. What is the safe bearing capacity of a soil? Briefly explain various methods adopted to improve it. (Dec.2016/Jan.2017)
8. Two loads of 1000KN and 1500KN are carried by square columns 500mm*500mm and 600mm*600mm respectively. The center to center distance between the columns is 5m. th footing is not to project more than 250mm beyond the outer edge of the smallest column. The allowable bearing capacity of the soil on which the columns are to rest is 250KN/m^{2-}. determine the dimensions of the combined footing. (Dec.2016/Jan.2017)
9. Sketch the elevation of brick wall build in a) English Bond b) Flemish Bond. Compare the merits and demerits of English bond and Flemish bond. (Dec.2016/Jan.2017)
10. Draw neat sketches of the following and explain: (a) Ashlar masonry. (b) Rubble masonry. (Dec.2016/Jan.2017)
11. Explain the essential requirements of good foundation. (Dec.2016/Jan2017)
12. With neat sketches, explain the following types of foundation: a) Combined footing b) strap footing. (Dec.2016/Jan2017)
13. With neat sketches, write the features of English bond and Flemish bond. (Dec.2016/Jan2017)
14. Briefly explain the classification of stone masonry. (Dec.2016/Jan2017)
15. With neat sketch, explain various joints provided in the stone masonry. (Dec.2016/Jan2017)
16. Write the advantages of cavity walls. (Dec.2016/Jan2017)
17. Explain the essential requirements of good foundation. (Dec.2015/Jan2016)
18. Explain with neat sketches various types of foundation. (Dec.2015/Jan2016)
19. What is meant by combined footing? What do you adopt it? (Dec.2015/Jan2016)
20. What is the safe bearing capacity of a soil? Briefly explain various methods adopted to improve it. (Dec.2015/Jan.2016)
21. Compare English bond, Flemish bond and double Flemish bond. (Dec.2015/Jan2016)
22. Explain classification of stone masonry. (Dec.2015/Jan2016)
23. Compare brick masonry and stone masonry. (Dec.2015/Jan2016)
24. Explain the essential functions and requirements of good foundation. (Dec.2014/Jan2015)
25. With neat sketches, explain the following types of foundation: a) mat foundation. b) pile foundation. (Dec.2014/Jan2015)
26. Find the dimensions of a combined rectangular footing for two columns A and B carrying loads of 500KN and 700KN respectively. Column A is 30cm*30cm in size and column B is

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40cm*40cm in size. The center to center spacing of columns is 3.4m. the SBC of the soil may be taken as 150KN/m^2. (Dec.2014/Jan2015)

27. Explain the classification of masonry briefly explain with neat sketches: a) Stretcher b) types of closure c) header d) quoin. (Dec.2014/Jan2015)
28. With a neat figure explain various types of joints used in stone masonry. (Dec.2014/Jan2015)
29. Lit the requirements hat foundation should satisfy. (Dec2011)
30. Define shallow and deep foundation. Explain with neat sketches. (Dec2011)
31. Explain the meaning of masonry bonds. Indicate which component of masonry is a weaker component. For brick masonry, indicate what features of masonry bonds that increase the strength of soil. (Dec2011)
32. Sketch the plans of consecutive two layers of English and Flemish bonds for a single brick thick wall. Name bricks in different locations on the sketch. (Dec2011)
33. Sketch random rubble masonry in stones in elevation and section. Mark through stone and lap length on the sketch. (Dec2011)
34. Define foundation and discuss various functions of foundation. (June/July2013)
35. What are the causes of failure of foundation? (June/July2013)
36. Mention different types of foundations? Under what circumstances pile foundation being adopted? (June/July2013)
37. Explain with neat sketch random rubble masonry. (June/July2013)
38. Draw the plan of $1^1/_2$ brick wall of English bond. (June/July2013)
39. What are the different types of foundations? Under what circumstances they are adopted? (June2012)
40. Define SBC of soil. Explain in detail, procedure for proportioning a rectangular footing for two columns carrying unequal load. (June2012)
41. List different methods of site exploration and explain any one of them. (June2012)
42. With reference to masonry construction, briefly explain the following terms: a) header and stretcher b) bond and course (June2012)
43. Write on Flemish bond in brick masonry. (June2012)
44. State advantages and disadvantages of stone masonry construction over brick masonry construction. (June2012)
45. Explain in detail the plate load test for SBC of soil. (Dec2012)
46. Enumerate the various methods of sub soil exploration. What are the factors on which the choice of a particular method depends? (Dec2012)
47. Mention the situations in which the pile foundations are adopted and also explain the classification of pile foundation. (Dec2012)
48. Sketch the elevation of a brick wall built in a) English bond b) Flemish bond. Compare the merits and demerits of both. (Dec2012)
49. Explain the sketches, various types of joints in stone masonry. (Dec2012)
50. Explain the essential requirements of good foundation. (June/July2018)
51. With the help of neat sketches explain various types f joints used in stone masonry. (June/July2018)
52. What is SBC? Briefly explain various methods adopted to improve SBC. (June/July2018)
53. Explain the following: a) header b) Flemish bond c) load bearing d) partition walls. (June/July2018)
54. What is foundation? Explain the functions of foundation. (Dec.2018/Jan2019)
55. Explain strip footing and strap footing with sketches. (Dec.2018/Jan2019)

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56. What are special features of English bond? Explain $1^1/_2$ brick thick wall. (Dec.2018/Jan2019)
57. What is pile foundation? Explain with sketches the classification of pie foundation based on its function. (Dec.2018/Jan2019)
58. Differentiate between random rubble masonry and course rubble masonry. (Dec.2018/Jan2019)
59. Draw the plan of $1^1/_2$ brick thick Flemish bond and explain its salient features. (Dec.2018/Jan2019)

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MODULE 3

1. Explain the following terms with respect to an arch: key stone, span, intrados, rise, voussoirs. (Dec.2013/Jan2014)
2. Define lintel and chajja. Draw a neat labelled diagram of a reinforced concrete lintel with chajja projection showing the position of reinforcement. (Dec.2013/Jan2014)
3. Give the classification of arches and explain stability of an arch. (Dec.2013/Jan2014)
4. Discuss the advantages of a flat roof. Briefly explain its advantages. (Dec.2013/Jan2014)
5. List he types of pitched roof. (Dec.2013/Jan2014)
6. Discuss the various flooring material used briefly. Explain any two of them in detail. (Dec.2013/Jan2014)
7. What are the advantages of an arch over a beam of same span? (Dec.2016/Jan.2017)
8. Sketch an RCC lintel for windows in brick masonry. Show arrangement of steel bars in it. (Dec.2016/Jan.2017)
9. Give the classification of arches and explain stability of an arch. (Dec.2016/Jan.2017)
10. Sketch a king post truss with timber, provided with tile roofing. Name various components of truss on the sketch. Indicate which members are subjected to compression and tension. (Dec.2016/Jan.2017)
11. What are the factors affecting the choice of flooring material? (Dec.2016/Jan.2017)
12. What are the materials used for flooring? (Dec.2016/Jan.2017)
13. Define lintel and write the function of lintel. (Dec.2016/Jan.2017)
14. With neat sketch explain various components of segmental arch. (Dec.2016/Jan.2017)
15. Write the requirements of good floor and factors affecting the selection of flooring material. (Dec.2016/Jan.2017)
16. Write the requirements of good roof. (Dec.2016/Jan.2017)
17. How do u classify arches? (Dec.2015/Jan.2016)
18. Define lintel How are they classified according to the materials of their construction. (Dec2015/Jan2016)
19. Draw a neat sketch of a segmental arch and explain various technical terms used in arch work (Dec2015/Jan2016)
20. Explain types of pitched roof. (Dec2015/Jan2016)
21. Write the advantages and disadvantages of flat roof over pitched roof. (Dec.2016/Jan.2017)
22. Factors affecting the choice of a flooring materials, briefly explain. (Dec2015/Jan2016)
23. With the help of neat sketch, explain various components of queen post truss. (Dec.2016/Jan.2017)
24. Draw a neat sketch of king post truss and show the various components. (Dec2015/Jan2016)
25. Distinguish clearly between a lintel and an arch. How does a flat stone arch differ from a stone lintel? (Dec2014/jan2015)
26. Briefly explain the functions of chejja, canopy nd balcony. (Dec2014/jan2015)
27. Explain briefly with the neat sketches: pitched roofs, flat roofs. (Dec2014/jan2015)
28. Explain types of flooring and factors affecting the selection of flooring materials. (Dec2014/jan2015)
29. Sketch a semi circular arch and show on it the following: keystone, springing line, voussers, intrados, extrados, rise, span, spandrel. (Dec2011)
30. Indicate structural advantage of a arch over a beam of same span. (Dec2011)
31. Sketch an RCC lintel for window in brick masonry. Show arrangement of steel bars in it. (Dec2011)

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32. Sketch a king post truss with timber, provided with tile roofing. Name various components of truss on the sketch. Indicate which members are subjected to compression and which members are subjected to tension. (Dec2011)
33. Name different types of floorings used in buildings. Indicate types of floorings suitable for following situations: a) floor should not make noise while in use. B) floor should be warm in winter and cool in summer. c) flooring should be inexpensive. D) floor should be waterproof. (Dec2011)
34. Sketch an RCC flat roof and indicate details of reinforcements. Discuss two advantages and disadvantages of such a roof. (Dec2011)
35. Define a lintel. Explain RCC lintel with neat sketch. (June/July2013)
36. Suggest suitable measures to avoid failure of an arch. (June/July2013)
37. Draw he neat sketch of the following: segmental arch and relieving arch. (June/July2013)
38. Define roof. What are the requirement of a good roof? (June/July2013)
39. What are the factors affecting selection of flooring materials? (June/July2013)
40. Sketch neatly lean to roof and name the parts. (June/July2013)
41. Explain with neat sketch functions of lintel, chezza and canopy n buildings. (June2012)
42. How are arches classified? How do you asses the stability of an arch? (June2012)
43. Draw a neat sketch of an arch and label vairous technical terms used in construction. (Dec2012)
44. Explain briefly different types of roof covering materials used in our country. (June2012)
45. What are the factors affecting that govern the selection of roofing materials? List the different types of flooring. (June2012)
46. Classify various types of lintels and discuss their importance. (Dec2012)
47. Draw a neat sketch of steel roof truss indicting bearing plate, purlins, and roof coverings. Name all the parts. (June2012)
48. Sketch the elevation of wooden queen post truss. Label the different parts. (Dec2012)
49. Write short notes on the following types of flooring: asphalt flooring, linoleum flooring, PVC flooring. Cork flooring and rubber flooring. (Dec2012)
50. Explain following terms with respect to arch: keystone, span, intrados, rise, vousoirs. (Dec2013/Jan2014)
51. Define lintel and chajja. Draw a neat labelled diagram of a reinforced concrete lintel with chajja projection showing the position of reinforcement. (Dec2013/Jan2014)
52. Give the classification of arches and explain stability of an arch. (Dec2013/Jan2014)
53. Discuss the advantages of a flat roof. Briefly explain its advantages. (Dec2013/Jan2014)
54. List the types of pitched roof. (Dec2013/Jan2014)
55. Discuss the various flooring materials used briefly. Explain any two of them in detail. (Dec2013/Jan2014)
56. Define lintel and mention its functions and classification. (June/July2018)
57. Sketch a king post truss made of timber, which has to support tile roofing. Name the components. (June/July2018)
58. Give the classification of arches and explain its stability. (June/July2018)
59. Discuss the various flooring materials used and explain any two of them in detail. (June/July2018)
60. Explain the following with sketch; a) RCC lintel b) stone lintel. (Dec2018/Jan2019)
61. Discuss various modes of failure of an arch and what are its remedies? (Dec2018/Jan2019)
62. Draw a neat sketch of king post wooden roof truss and label its parts. (Dec2018/Jan2019)

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63. Mention the types of sloped roof. Explain any three types of sloped roof with sketches. (Dec2018/Jan2019)
64. What are the requirements of good floor? What are the components of ground floor with mosaic flooring? (Dec2018/Jan2019)
65. What is an arch? Draw the sketch of elemental arch. (Dec2018/Jan2019)

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MODULE 4

1. Write short notes on the following: collapsible steel door and bay window. (Dec2013/Jan2014)
2. Explain the factors to be considered while locating th positions of doors and windows in a building. (Dec2013/Jan2014)
3. What are the salient features o a framed paneled door? Explain. (Dec2013/Jan2014)
4. Draw the plans of the following types of stairs. Briefly explain them. Dog legged stairs and open newel stairs. (Dec2013/Jan2014)
5. Draw the section of a typical stair and level all the parts explain each part. (Dec2013/Jan2014)
6. Explain the terms: shoring, slip forming and guiniting. (Dec2013/Jan2014)
7. Write a neat sketch of a door with a single shutter and its door frame. Name different components of frame and shutter. (Dec2016/Jan2017)
8. Explain along with sketch: collapsible door and bay window. (Dec2016/Jan2017)
9. State and briefly explain the requirement of good stair. (Dec2016/Jan2017)
10. Explain different types of stairs. (Dec2016/Jan2017)
11. Define shoring. Explain different types of shoring. (Dec2016/Jan2017)
12. Explain the following with neat sketches: partly paneled, glazed doors and revolving doors. (Dec2016/Jan2017)
13. Explain the following with sketches: bay window and corner window (Dec2016/Jan2017)
14. Write the requirements of good stairs. (Dec2016/Jan2017)
15. Explain the classification of stairs. (Dec2016/Jan2017)
16. Write short notes on: shoring and underpinning. (Dec2016/Jan2017)
17. List the factors affecting the selection of doors and windows. (Dec2015/Jan2016)
18. Explain types of doors. (Dec2015/Jan2016)
19. Write a note on the following: bay windows and clear- storey window. (Dec2015/Jan2016)
20. What are the requirements of good stair. (Dec2015/Jan2016)
21. Explain classification of stairs. (Dec2015/Jan2016)
22. Draw plan and section of typica dog legged RCC stair. (Dec2015/Jan2016)
23. What do you understand by underpinning? When do you require it? Explain the pit method of underpinning. (Dec2015/Jan2016)
24. Explain briefly any five with neat sketch: landing, newel post, hand rail, flight, baluster, riser and tread. (Dec2014/Jan2015)
25. Explain briefly any five with neat sketch: casement window. Sash door, battened and legged doors, framed and paneled doors, dormer window, corner window. (Dec2014/Jan2015)
26. Define with neat sketch: frame, shutter, panel and style. (Dec2014/Jan2015)
27. Define: smart materials, form work and scaffolding. (Dec2014/Jan2015)
28. Sketch a door with a single shutter and its door frame. Name different components of frame and shutter. (Dec2011)
29. Write a note on windows function in northern hemisphere of the earth. (Dec2011)
30. Explain with a neat sketch louvered window with glass louvers. explain use of plastic louvers in an office building. (Dec2011)
31. Sketch a dog legged stair case in RCC in plan and elevation for a residential building. (Dec2011)
32. Define roof. What are the requirement of a good roof. (June/July2013)

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33. Define the terms used in doors and windows: frame, shutters, style, panel, loclrail. (June/July2013)
34. Write briefly on any one of the following with sketches: panneled door, bay window, ventilators and revolving doors. (June/July2013)
35. Draw the elevation and section of a glazed window. (June/July2013)
36. What are requirements of a good stairs? (June/July2013)
37. What are the requirements of good formwork? (June/July2013)
38. What do you mean by shoring and underpinning? (June/July2013)
39. Explain briefly with sketches: fully paneled door, rolling shutters. (June2012)
40. List all the fixtures and fastenings for doors and windows. (June2012)
41. List different types of windows used in buildings and explain an two of them. (June2012)
42. List different types of staircases and explain under what circumstances they are used. (June2012)
43. Sketch the section across the beam, the formwork required for beam and slab floor giving details of its components. (July2012)
44. What are the factors considered while locating doors and windows. (Dec2012)
45. Draw labelled sketch of battened legged and braced door. (Dec2012)
46. Write notes on following: landing, nosing, going, stringer, newelpost, handrail. (Dec2012)
47. State briefly the requirements of good stairs. (Dec2012)
48. Differentiate between a) helical stair and spiral stair. b) RCC stair with slab spanning horizontally and slab spanning longitudinally. (Dec2012)
49. Write short notes on: a) scaffolding b) underpinning. (Dec2012)
50. Write short notes on: a) collapsible steel door b) bay window. (Dec2013/Jan2014)
51. What are the factors considered while locating doors and windows. (Dec2013/Jan2014)
52. What ae salient features of framed paneled door? (Dec2013/Jan2014)
53. Draw the plans of the following type of stairs. Briefly explain them: dog legged stairs, open newel stairs. (Dec2013/Jan2014)
54. Draw the section of a typical stair and level all the parts? Explain each part. (Dec2013/Jan2014)
55. Explain the terms: shoring, slip forming and guiniting. (Dec2013/Jan2014)
56. Explain salient features of framed and paneled door with sketch. (Dec 2018/Jan2019)
57. Differentiate between bay window and corner window with sketches. (Dec 2018/Jan2019)
58. What are the requirements of good stair? (Dec 2018/Jan2019)
59. What is shoring/ explain raking shore with a sketch. (Dec 2018/Jan2019)
60. What are the requirements of locating doors and windows? (Dec 2018/Jan2019)
61. Briefly explain the factors to be considered while locating doors and windows. (June/July208)
62. With the help of a neat sketch briefly explain the do legged staircase and its components. (June/July208)
63. With the help of a neat sketch explain the following: wooden paneled door and collapsible door. (June/July208)
64. Write a note o different type of stairs and explain the requirements of a good stair. (June/July208)

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MODULE 5

1. Explain various defects in plastering. (Dec2013/Jan2014)
2. List the various constituents of good paint. (Dec2013/Jan2014)
3. Explain the process of distempering. (Dec2013/Jan2014)
4. Discuss the causes and effects of dampness in a building. (Dec2013/Jan2014)
5. List the important properties and uses of the following building materials: aluminum, plastic and varnish. (Dec2013/Jan2014)
6. Mention and explain different types of paints. (Dec2016/Jan2017)
7. What are the defects in plastering? (Dec2016/Jan2017)
8. What is pointing? Explain different types of pointing. (Dec2016/Jan2017)
9. Explain damp proofing? What are the causes of dampness? (Dec2016/Jan2017)
10. Write the objectives of plastering and requirement of good plaster. (Dec2016/Jan2017)
11. Discuss the defects in plastering. (Dec2016/Jan2017)
12. Briefly explain method of applying stucco plastering. (Dec2016/Jan2017)
13. Briefly explain the method of damp proofing. (Dec2016/Jan2017)
14. Explain in brief defects in painting and constituents of paint. (Dec2016/Jan2017)
15. Describe the procedure of painting on new wood work. (Dec2016/Jan2017)
16. What are the main objectives of plastering? (Dec2015/Jan2016)
17. Explain types of plaster finishes. (Dec2015/Jan2016)
18. What are the defects in painting? (Dec2015/Jan2016)
19. Explain the procedure of painting: a) wood surface b) plastered surface c) iron and steel surface. (Dec2015/Jan2016)
20. Explain methods of damp proofing. (Dec2015/Jan2016)
21. What are the materials used for damp proofing course? (Dec2015/Jan2016)
22. Explain purpose of plastering. Explain methods of plastering. (Dec2014/Jan2015)
23. Explain in brief defects in painting and constituents of a paint. (Dec2014/Jan2015)
24. Define: a) smart materials b) form work and scaffolding. (Dec2014/Jan2015)
25. Explain in brief causes and effects of dampness in building. (Dec2014/Jan2015)
26. Describe procedure for application of pant on wood surface and on new plastered surface with cement mortar. (Dec2011)
27. Discuss defects in plastering. (Dec2011)
28. Describe procedure of providing stucco plastering. (Dec2011)
29. Write short notes on: a) damp proof course b) varnish. (Dec2011)
30. What are the objects of plastering? List the requirements of a good plaster. (June/July2013)
31. What are the defects arise in plastering? (June/July2013)
32. Explain the procedure of painting for iron and steel surfaces. (June/July2013)
33. What is damp course? Explain its necessity I a building. (June/July2013)
34. Briefly explain the constituents of paint. (June2012)
35. Mention the type of paint to be used and procedure of applying them on the following: inner walls of residential buildings, outer walls of building and doors and windows. (June2012)
36. Explain different types of plaster finishes. (July2012)
37. What is damp proof course? Explain its necessity in building. (July2012)
38. Explain the purpose of plastering. Explain the various type of mortars used for plastering. (Dec2012)
39. What is the purpose of painting? (Dec2012)
40. Mention the characteristics of an ideal paint. (Dec2012)

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41. What are the effects of dampness? Mention the methods of damp proofing. (Dec2012)
42. Explain various defects in plastering. (Dec2013/Jan2014)
43. List the various constituents of paint. Discuss each constituent of paint. (Dec2013/Jan2014)
44. Explain the process of distempering. (Dec2013/Jan2014)
45. Discuss the causes and effects of dampness in a building. (Dec2013/Jan2014)
46. List the important properties and uses of the following building materials: aluminum, plastic, varnish. (Dec2013/Jan2014)
47. Briefly explain the purpose of plastering and explain the various methods of plasters. (June/July2018)
48. Explain in briefly causes and effects of dampness in a building. (June/July2018)
49. What are the objects of plastering and painting? (June/July2018)
50. Describe the different types of paints available in market and their specific usage. (June/July2018)
51. Discuss the defects in plastering. (Dec2018/Jan2019)
52. Name and explain the constituents of oil paint. (Dec2018/Jan2019)
53. What are the causes of damping in the building and what are its remedies? (Dec2018/Jan2019)
54. Explain the objects of plastering and types of plaster finishing. (Dec2018/Jan2019)
55. Explain the procedure of painting for the following: new wood work surface and new plastered surface. (Dec2018/Jan2019)
56. Differentiate between stucco plastering and lathe plastering. (Dec2018/Jan2019)

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