

**BALASORE SCHOOL OF ENGINEERING**  
**BUILDING MATERIAL & CONSTRUCTION TECH.**  
**THEORY-04**

**NAME-ER. DEEPALI BARIK**

**BRANCH-CIVIL ENGG.**

**SEMESTER-3RD**

**CHAPTER-01**  
**PART-01**

**2 marks**

1. **What do you mean by igneous rock?** [2014(W) 1(a)]]

**Ans.** The rocks which are formed by the cooling of magma are known as the igneous rock.

2. **What do you mean by dressing of Stone ?** [2014 (W) 4(a)]

**Ans.** The stone after being quarried are to be cut into suitable size & with suitable surface. This process is known as the dressing of stone.

3. **What is metamorphic rocks ?** [2013(W) 1(a)] [2014 (W) 2(a)] [2015 (W) 1(a)]

**Ans.** Metamorphic rocks are formed by the change in character of the pre-existing rocks. The igneous as well as sedimentary rocks are changed in character when they are subjected to high heat & pressure.

4. **What is foliated rock?** [2017 (W)1(d)]

**Ans.** These rocks have a tendency to be split up in a definite direction only. The foliated structure is very common in case of metamorphic rocks.

5. **What do you mean by Calcinations ?** [2017(W) 1(j)]

**Ans.** Calcinations is a high temperature reaching where lime stone dissociates to form clinker & gas.

**6 MARKS**

1. **Explain the characteristics of good building stone.** [2013(W) 1(b)]Old [2014(W) 1(b)]

**Ans.**

- a. Qualities Strength :** The Crushing strength should be greater than 100N/mm<sup>2</sup>
- b. Appearance:** The stone which are to be used for the work should be decent in appearance & they should be capable of presenting their colour uniformly for a longtime.
- c. Durability:** It should be durable.
- d. Facility of dressing:** The stones should be each that they can be easily molded, cut & dressed.
- e. Fracture:** For a good building stone its structure should be sharp, even, bright & clear with grains well cemented together
- f. Hardness:** The Co-effective of hardness as worked out in hardness test should be greater than if for a stone to be used in road work.
- g. Resistance to fire:** The minerals composing stone should be such that sharp of stone is preserved when a fire occurs

2. **Describe the grading of aggregate.** [2015(W) 1(b)]

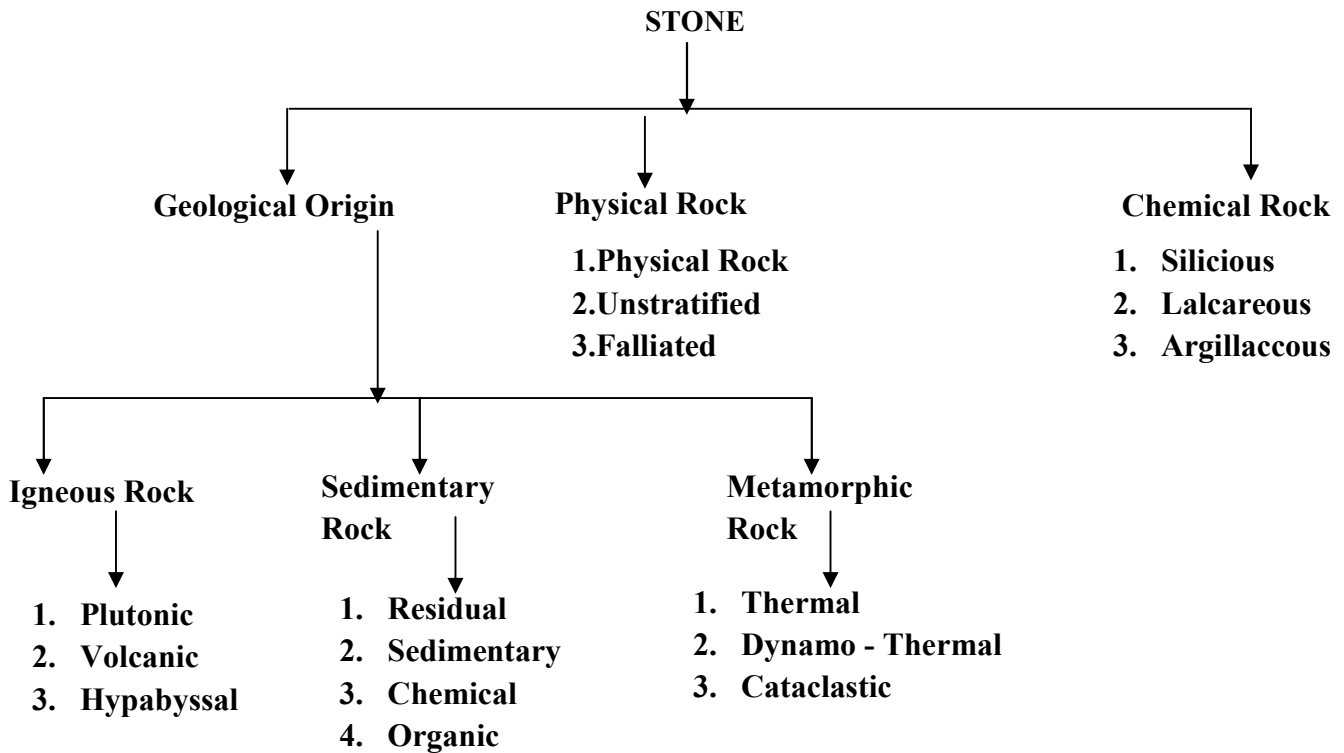
**Ans.** In order to obtain concert to denser quality the fine & coarse aggregates are properly graded. The grading of fine aggregate is expressed in terms of BIS test bieves nos 480, 240, 120, 60, 30 & 15. The grading of fine aggregates has a marked effect on the uniformity, workability & Finishing qualities of concrete.

**8 marks**

**1. What are the main classification of rocks?**

Explain briefly [2013 – III Sem (w) (New)] [2014(W) 2(b)], [2014 (W) Old 3 (C)]

**Ans.**



Geological origin →  
Igneous Rock →

- i. The rocks which are formed by cooling of magma is known as Igneous Rock.
- ii. The matter or pasty rock material is known as magma.
- iii. The magma sometimes tries to come out to the earth surface through cracks or weak pores of earth.
- iv. The inside of earth surface is high temperature so as to cause fusion by heat and ordinary pressure.

**Igneous rock are classified as :-**

- 1. *Plutonic*
- 2. *Volcanic*
- 3. *Hypabyssal*

**1. Plutonic** →

- i. Such rock are formed by cooling of magma as a considerable depth of earth surface. The cooling is very slow.
- ii. The rock posses crystal structure.  
Eg:- Hranite

**2. Volcanic** →

- i. Such rocks are formed due to passing of magma on Earth's surface
- ii. The cooling is very rapid.
- iii. These rocks are extremely fine grained structure.  
Eg:- Basalt

### 3. **Hypabyssal** →

- i. Such rocks are formed due to cooling of magma at a shallow depth from the earth surface.
- ii. The cooling is very quick.
- iii. These rock posses grained crystalline structure.

### 2. **Sedimentary Rock** →

- i. These rocks are called by the deposition of weathering or the pre-existing rock.
- ii. Rain, Wind, flowing water such agent transfer all the products that are ultimately carried away on the place of origin.

**Sedimentary rocks are classified as :-**

1. **Sedimentary Rock**
2. **Residual Rock**
3. **Organic Rock**
4. **Chemical Rock**

#### 1. **Sedimentary Rock :-**

Insoluble product are carried away in suspension and wind some product are deposit is known as sedimentary deposit rock.

Eg.- Gravel, Limestone, Sandstone, Gypsum

#### 2. **Residual Rock :-**

Some of portion of product of weather at the side of origin such the deposit is known as residual rock.

#### 3. **Organic Rock :-**

Some portion of product of weathering is deposit through agency of orgin is called organic rock.

#### 4. **Chemical Rock :-**

Some chemical are carried away insoluble may be deposit by physical process is known as chemical deposit rock.

### 3. **Metamorphic Rock** →

- i. These rocks are formed by change in character of pre-existing rock.
- ii. Igneous & sedimentary rock as change in character because of high temperature and pressure.
- iii. This type of rock is known as metamorphic rock.

**Metamorphic rocks are classified as :-**

1. **Thermal**
2. **Dynamo - Thermal**
3. **Cataclastic**

#### 1. **Thermal :-**

The heat is per-dominal factor for this type of metamorphism.

#### 2. **Dynamo – Thermal:-**

These is rise in temperature with increase in depth hence the temperature is combination stress and being about the change of rock such as metamorphism is known as dynamo thermal metamorphism.

#### 3. **Cataclastic:-**

As the surface of earth temperature are low and metamorphic responsible by direct only.

### **Physical Rock** →

- **Stratified Rock :-**

The rock are passes of stratification & such rock can easily split of along these plane.

Eg. – Sedimentary rocks and stratified rocks.

- **Unstratified rock :-**
  - i. The structure crystalline granular or compact granular.
  - ii. The igneous rock of volcanic rock and sedimentary rock affected by moment of earth there type of rock.
- **Foliated rock :-**

This rock have a tendency to be split up in a definite direction.  
Eg.- Metamorphic rock

#### **Chemical Rock** →

- **Siliceous :-**
  - i. In this rock silica pro-dominate.
  - ii. The rock hard and durable.
  - iii. They are not easily affected by weathering agency.
- **Argillaceous :-**
  - i. In this rock are clay pre-dominate.
  - ii. Such rocks may be dense compact and they may be soft.
- **Calcareous :-**
  - i. These rocks have calcium carbonate.
  - ii. The durability of these will depends upon the constituent present in surrounding atmosphere.  
Eg. Marble & lime stone.

#### **2. Explain the characteristics of goods building stone. [2013 Q1 (b)][2014 (W) 5 (b)]**

**Ans.** Following are the qualities of characteristics of a good building stone.

1. **Crushing Strength :-**

The crushing strength should be greater than  $100\text{N/mm}^2$
2. **Appearance:-**

A good building stone should be capable of dissolving their colour uniformly for long time.
3. **Durability:-**
  - i. A good quality stone should be durable.
  - ii. Various factor contribute the durability of stone they are its chemicals composition resistance of atmosphere location in structure.
4. **Facility of dressing:-**
  - i The stone should be such that they can be cut moulded and dress.
  - ii It is important to consider economic points of view.
5. **Fracture:-**

For a good building stone fracture should be sharp even clear with well cement together.
6. **Hardness:-**
  - i. The coefficient of hardness work in hardness test should be greater than a stone to be used in road work.
  - ii. If the hardness is 14-17. The stone is called medium hardness.
  - iii. If the stone is less than 14 the stone is said to the poor hardness.

### 7. Resistance of fire:-

- i. Resistance of fire mean the stone is preserves when fire occurs.
- ii. The lime stone resist fire upto 800C"

### 8. Specific Gravity

- i. For a good building stone its specific greater than 2.7.
- ii. The heavy stones are more computed and less porous.

### 9. Texture:-

- i. A good building stone should have crystalline structure free from cavities or patches of self or loss material.

### 10. Toughness Index:-

- i. If the valus of toughness index comes below is the stone is not tough.
- ii. If it became 13-19 the stone is said to be moderate tough or medium tough.
- iii. If it exceeds 19, the toughness of stone is said to be high.

### 11. Water absorption:-

- i. All the stones are more or less porous.
- ii. For good stone the percentage of absorption by wet for 24 hours should not exceed 0.6.
- iii. The porous stone seriously effect the durability of stone.

### 12. Nature of Stone:-

- i. He building stone are obtain from rock.
- ii. These rocks have a plane of division along which stone can easily split and it in.

## 3. What do you mean by dressing of stone ?2017

**Ans.** The stones after being quarried, to be cut into suitable size & with suitable surface. This process is known as the dressing of stone.

w.e.t the place of work, the dressing can be divided into two types, namely, quarry dressing & site dressed. At the quarry place, the stones are roughly dressed to secure the following advantages.

- At quarry Site, it is possible to get cheap labour for the process of dressing of stones.
- It is possible to sort out stones for different works if quarry dressing is practiced.
- The irregular & rough portion of the stones are removed which decreases the weight of stones & it also facilitates easy transportation of the stone.
- The nature bed surface of stones can be made prominent during the quarry dressing.
- The stones when quarried freshly contain quarry sap & hence they are comparatively soft & can be easily dressed.

## 4. Describe at least five Causes of decay of Stone.2014

**Ans : Causes of decay of Stone.**

**(1) Compact silicious stones:** It is desirable) to use only compact silicious stones for the external surfaces of important buildings. These stones must have a dense crustalline texture. The use of standstones cemented with silicious binding material should be made and sue limestones or calcareous sandstones with open texture should be avoided for the external surfaces in Industries towns.

**2. External renderings:** For ordinary buildings, l external renderings such as pointing or plastering should be given to the stone surface at the time of construction.

**(3) Joints:** All joints in t he stone masonry should be completely filled in so as to have a sound and solid structure without hollows or cavities.

**(4) Natural beds:** The stones should he placed ill posit ion on their natural beds.

**(5) Qualities of stones:** The use of finished, polished and well dressed stones should be preferred to the rough stones.

**(6) Seasoned stones:** The freshly quarried Stones contain quarry sap which accelerates the decaying action and hence such stones should be seasoned for a sufficient time by exposing them before they are used.

**(7) Rain water:** The action of rain water on stones is two fold-physical and chemical. The rain wets the surface of stone and it is dried by sunshine. Such alternate wetness and drying result in the disintegration of stone. Such alternate wetness and drying result in the disintegration of stone. This is the physical action of rain water.

The rain water, as it descends through the atmosphere to the surface of earth, absorbs carbon dioxide (CO<sub>2</sub>) hydrogen sulphide (H<sub>2</sub>S) and other gases present in the atmosphere. These gases act adversely on stones and they cause decay of stones. This is the chemical action of rain water.

**(8) Temperature variations:** The rise of temperature results in expansion of stones, and the fall of temperature causes contraction of stones. Large temperature variations are frequent. The stones are easily deteriorated because of the setting up of internal stresses.

**(9) Vegetable growth:** The creepers and certain trees develop on stone surface with their roots in joints between stones. Such roots attract moisture and keep the stone surface damp. At the same time, they try to expand. Such actions then accelerate the decay of stones.

10. The wind contains fine particles of dust, if it is blowing with high velocity such particles will strike against the stone surface and thus the stones will be decayed. The wind also allows rain water to enter pores of stones with force. Such water on freezing, expands and splits the stones.

## Chapter – 2 2 Marks

1. **WHAT IS FROG ? WHAT ITS OBJECTIVES [2013(W) 2(A)] [2015(W) 2(A)]**

**Ans.** Frog is a mark of depth about 10mm to 20mm which is placed on raw brick during moulding.

→ It indicates the trade name of the manufacturer.

→ It helps for joining between one brick to another brick.

2. **Name the constituents of brick earth, which prevents cracking, Shrinking & warping of raw bricks. 2014**

**Ans.** The constituents of brick earth are alumina, silica, lime, oxide iron, magnesia etc. The presence of silica prevents cracking, shrinking & warping of raw brick.

3. **What is pugging in the manufacture of brick ? 2013**

**Ans.** The process of grinding clay with water & making it plastic is known as the pugging.

4. **What is meant by modular bricks ? [2011(w) 1(a)] [2015(w) 4(a)] [2014(w) 2(a)]**

**Ans.** The size of modular brick is 200x100x100mm

## 6 Marks

1. **WHAT ARE THE ADVANTAGES & DISADVANTAGES OF BRICKS OVER STONE ? 2014-1(b)**

The brickwork is advantage stonework in the following respects :

- (i) At places where stones are not easily available but where there is plenty of clay, the brickwork becomes cheaper than stonework.
- (ii) The cost of construction works out to be less in case of brickwork than stonework as less skilled labour is required in the construction of brickwork.
- (iii) No complicated lifting devices are necessary to carry bricks as they can be easily moved by manual labour.
- (iv) The bricks resist fire better than stones and hence, in case of a fire, they do not easily disintegrate.
- (v) The bricks of good quality resist various atmospheric effects in a better way than the stones.
- (vi) In case of brickwork, the mortar joints are thin and hence the structure becomes more durable.
- (vii) It is easy to construct connections and openings in case of brickwork than stonework.

The brickwork is disadvantages to the stonework in the following respects:

- (i) The brickwork is less watertight than stonework. The bricks absorb moisture from the atmosphere and dampness can enter the building.
- (ii) The brickwork does not create a solid appearance in relation to like stonework and hence, for public buildings and monumental structures the stonework is found to be more useful than brickwork.
- (iii) The stonework is stronger than the brickwork.
- (iv) The architectural effects of better quality can be developed by the stonework.
- (v) The stonework is cheaper at places where stones are easily available.

### 8 MARKS

#### 1. DESCRIBE THE DIFFERENT SALIENT POINTS OF A GOOD QUALITY BRICKS

[2013 (w) 2(c)] [2014(w) 2(c)]

**Ans.** The good bricks which are to be used to the construction of important structures should possess the following quantity.

- i. The brick should be table moulded, well burnt in kilns, copper coloured free from cracks & with sharp and square edge. The colour should be uniform & bright.
- ii. The brick should be uniform in shape & should be in standard size.
- iii. The bricks should give clear metallic ringing sound when struck with each other.
- iv. The brick should show a bright homogeneous & uniform compact structure free from void.
- v. The brick should not absorb water more than 20% by weight for first class brick when soaked in cold water for a period of 24 hours.
- vi. The brick should be sufficiently hard.
- vii. The brick should have low thermal conductivity and they should be sound proof.
- viii. The brick when soaked in water for 24 hours should not show deposit of white salt when allowed to dry.
- ix. The brick should not have crushing strength below 5.50N/mm<sup>2</sup>

#### 2. Explain the different operation involved in the brick manufacturing process [2015 (w) 1(b)]

**Ans.** In the process of manufacturing bricks the following four operations are involved.

1. Preparation of Clay



2. Moulding
3. Drying
4. Burning

**1. Preparation of Clay:-**

The clay for brick is prepared in the following order.

- i. Unsoiling
- ii. Digging
- iii. Cleaning
- iv. Weathering
- v. Blending
- vi. Tempering

i. Unsoiling→

The top layer of soil about 200mm in depth is taken out and thrown away. The clay in the top soil is full of impurities which to be rejected for preparation of brick.

ii. Digging→

The clay is then dug out from the ground. It is then spread on the ground leveled just little deeper than the general level of ground.

iii. Clearing→

The clay obtained from digging should be deaned of stones, publes, vegetable matter etc. If these particles are excess then the clay is washed and screened.

iv. Weathering→

The clay is than exposed to atmosphere for softening and mellowing. This period various from few weeks to full season.

v. Blending→

The clay is made loose and any ingrediedient is to be added is spread at its top. The blending indicates intimate missing.

vi. Tempering→

In this process of tempering the clay is brought to proper degree for hardness. The manufacturing good bricks on large scale the tempering is done in a pug mill.

**2. Moulding** →

The clay which is prepared as above is sent to next operation i.e moulding.

1. Hard Moulding

- a. Ground Moulding
- b. Table Moulding

2. Machine Moulding

- a. Plastic clay
- b. Dry clay

1. Hand Moulding →

In hand moulding the bricks are moulded by hand i.e manually. It is adopted for manufacturing process it is of two types.

- a. Ground Moulding
- b. Table Moulding

2. Machine Moulding→

The moulding is done by machines. It proves to be economical when brick in huge quality are to be manufactory at some spot in short time. It si also helpful for moulding hard and strong clay. It is of two types.

- a. Plastic clay machine
- b. Dry clay machine

3. **Drying**→  
The damp bricks, if burnt are likely to be cracked and distorted. Hence the moulded brick are dried before they are taken for next operation of burring.
4. **Burring**→  
This is a very important operation in the manufacture of bricks. It imparts hardness and strength to the brick and makes them dense and durable. The bricks should be burnt properly. If bricks are over burnt, they will be soft and hence cannot carry load. It is two types.
  - a. Clamp
  - b. Kiln

### 3.WHAT ARE KILN BURNT BRICKS ? DESCRIBE BRIEFLY THE PROCESS LKIN BURNT BRICKS. (2015 W-6-C)

A kiln is a large oven which is used to burn bricks. The kilns which are used in the manufacture of bricks are of the following two types:

- (1) Intermittent kilns
- (2) Continuous kilns,

**(1) Intermittent kilns:** These kilns are intermittent in operation which inea is that they are loaded, fired, cooled and unloaded. Such kilos may be either rectangular or circular in plan. They may he over ground or underground. They are classified in two ways:

- (i) Intermittent up-draught kilns
- (ii) Intermittent down-draught kilns.

**(i) Intermittent up-draught kilns:** These kilns are in the form of rectangular structures with thick outside walls. The wide doors are provided at each end for loading anti unloading of kdns. The flues are channels or passages which are provided to carry flames or hot gases through the body of kiln. A temporary roof may be installed of any light material. Such roof gives protection to the raw bricks from rain while they are being placed in position. This roof is to be removed when the kiln is fired.

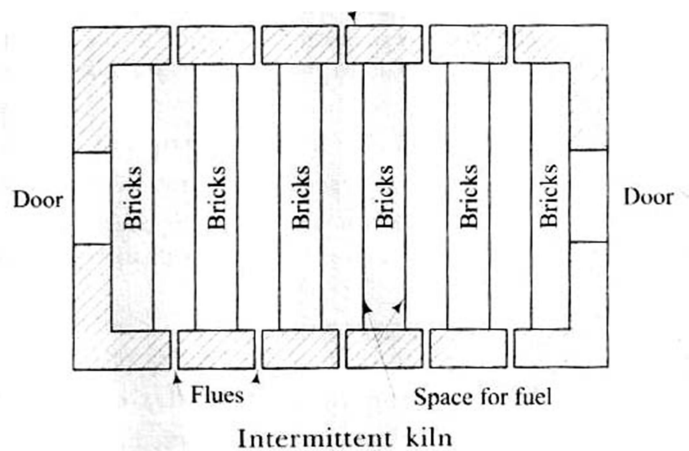


Fig. 4-5 shows the plan of a typical intermittent up-draught kiln. The working of the kiln is as follows:

(a) The raw bricks are laid in rows of thickness equal to 2 to 3 bricks and of height equal to 6 to 8 bricks. A space of about 2 bricks is left between adjacent rows. This space is utilized fur placing fuel.

(b) The fuels are filled with brushwood which takes up a fire easily. The interior portion is then filled with fuel of bigger size.

(c) An arch like opening is formed by projecting 4 to 5 rows of bricks. The projection of each row is about 30 mm to 40 mm.

(d) The loading of kiln with raw bricks is then carried out. The top course is finished with flat bricks. Other courses are formed by placing bricks on edge.

(e) The end doors are built up with dry bricks and are covered with mud or clay.

(f) The kiln is then fired. The fire can be regulated by opening or (losing the iron sheet doors of the fire holes and by controlling the supply of fuel. The progress of burning at any instant can be seen through these holes. For the first three days, the firing is kept slow by proper manipulation of flues. The strong fire is maintained for a period of 48 to 60 hours. The draught rises in the upward direction from bottom of kiln and brings about the burning of bricks.

g) The kiln is allowed to cool down gradually for at least seven days and the bricks are then taken out.

**Intermittent down draught kilns:** These kilns are rectangular or circular in shape. They are provided with permanent walls and closed tight roof. The floor of the kiln has openings which are connected to a common chimney stack through flues. The working of this kiln is more or less similar to the up-draught kiln. But it is so arranged in this kiln that hot gases are carried through vertical flues upto the level of roof and they are then released. These hot gases move downward by the chimney draught and in doing so, they burn the bricks.

**(2) Continuous kilns:** These kilns are continuous in operation. This means that loading, firing, cooling and unloading are carried out simultaneously in these kilns. There are various types of the continuous kilns. Following three varieties of continuous kilns will be discussed:

(i) Bull's trench kiln

(ii) Hoffman's kiln (iii) Tunnel kiln.

### Chapter – 3

#### 2 marks

1. **WHAT IS MEANT BY GLAZING ? [2013 (W) 7(A)] [2015 (W) 2(A)]**

**Ans.** A glaze is a glassy coat of thickness about 0.1 to 0.2 mm applied on the surface of an item & then fused into place by firing at a high temperature.

2. **DIFFERENTIATE BETWEEN TERRACOTTA & PORCELAIN.  
[2014 5(A)] [2018 (W) 5(A,2B)] [2015 6(A)]**

**Ans.** The terracotta means the baked earth. It is thus types of earthenware are porous pottery made from local clays & glazed with glazes containing galena. It is soft enough to be scratched by a unit the term porcelain is used to indicate fine earthen ware which is white thin & same transparent since the colour of porcelain is white it is referred to as white ware.

3. **WRITE DOWN TWO USED OF TERRACOTTA : 2014 3(A),2018**

Used of terracotta

It used for ornamental work.

The hollow terracotta blacks are used for various ornaments owkr such as facing work arches etc

**6 marks**

**1. NAME THE DIFFERENT CLAY PRODUCTS USED IN CONSTRUCTION INDUSTRIES & EXPLAIN BRIEFLY ABOUT ARE OF THEM. [2013 (W) 3(B)] [2015 (W) 2(B)]**

**Ans.** Clay product plenty in nature.

Tiles The tiles may be defined as thin slabs thinner than brick. The tiles may be classified as two categories.

- i. Common Tiles : These tiles have different shapes & size. They are mainly use for flooring & roofing.
- ii. Encaustic tiles : These tiles have different decorative purposes in floors, walls celling & roofs  
Depending upon the use to which the tiles are put the following are their different types.
  - a. Drain Tile: - These tiles are circular, Semi circular or egmental. They are also used to convey irrigation water.
  - b. Floor tiles : - The floor tiles may be square or hexagonal in shape. These are flat files should be hard & compact so that they can resist wear & tear in a better way.

**2. DEFINE GLAZING WITH ITS CLASSIFICATION & USES. (2014 3(b))**

Ans. A glaze is a glassy coat of thickness about 1 to 0.2 mm applied on the surface of an item and then used into place by fuming at a higher temperature. The following are the purpose for which glazing is done.

1. To improve the appearance.
2. To make the article durable and imper vious.
3. To produce the decorative effects.
4. To protect the article from action of atmospheric encies, chemicals, sewage etc.
5. To provide smooth surface.

The glazing may be transparent like glass or it ay be opaque like enamels, For obtaining coloured lazes, the oxides and salts of various metals or special fractory colouring agents are added. For instance, the ldition of copper oxides will impart green colour and ldition of iron oxide will impart red and brown colours.

**Transparent glazing** - This type of glazing may given by the following two methods.

1. Salt glazing.
2. Lead glazing.

**1. Salt glazing** - This method is useful for sanitary pes and chemical stone wares. The quantity of wet salt id throwing it at proper time should he done with treme care. The colour of articles glazed by this method brownish.

**2. Lead glazing** In this method of glazing, the aze does not penetrate into the body of ware and as a atter of fact, it can easily be detached from the ware irface. This method is used for terra-cotta, fire-clay ares and ear then wares.

**Opaque glazing**—This type of glazing is adopted give better appearance than that given by the burnt arial. The superior clay is finely powdered and dried. ie sufficient quantity of water is added to such clay to ake a plastic cream like substance, known as the slip. ie sanitary articles are glazed by this process.

**1.NAME THE DIFFERENT TYPES OF TEST IN CEMENT. [2013 (W) 3(A)]**

- Ans.** i. Consistency test  
ii Setting time  
iii Soundness test  
iv Fitness test  
v. Compressive test  
vi. Tensile test

**3.WHAT IS THE PURPOSE OF CONSISTENCY TEST OF CEMENT & NAME THE APPARATUS USED FOR THIS TEST ? [2012 (W) 7(A)]**

**Ans.** The amount of water required for preparing cemet past i.e the purpose of consistency test of cement & vicat apparatus is used for this test.

**4.Name two uses of white cement ? [2017 (w) 1(viii)] [2014 (w) 3(a)]**

- Ans.** Two uses of white cement.  
i. floor finish ii. Plastering & ornamental work.

**5. What do you mean by water cement ratio ? [2014 (w) 4 (a)]**

**Ans.** It is the ratio between weight of water to the weight of cement in a concrete mix.

**6. What do you mean by soundness of cement ? [2015 (w) 2(b)]**

**Ans.** Soundness of cement detect the presence of uncombined lime in cement. This test is performed with the help of chatelier apparatus.

→ It consists of a brass mould of diameter 30mm & height 30mm. There is a split mould & it does not exceed 0.50mm. There are two indicators with pointed end.

**6. WHAT ARE THE INGREDIENT PRESENT IN THE ORDINARY PORTLAND CEMENT? 2013-3(a)**

The main ingredient present in the ordinary Portland is alumina, silica, iron oxide, Magnesia, sulphur, alkali calcium sulphate.

**8 marks**

**DESCRIBE BRIEFLY THE METHODS OF MANUFACTURE OF CEMENT (2015-4(C))**

**OR**

**WHAT IS CEMENT ? DESCRIBE BRIEFLY ITS MANUFACTURING PROCESS IN INDUSTRY "2014(w) 5(C)**

**Ans.** Cement is a binding materilal which is obtained by burning and crushing the Stones containing clay, carbonate of lime and some amount of carbonate of magnesia.

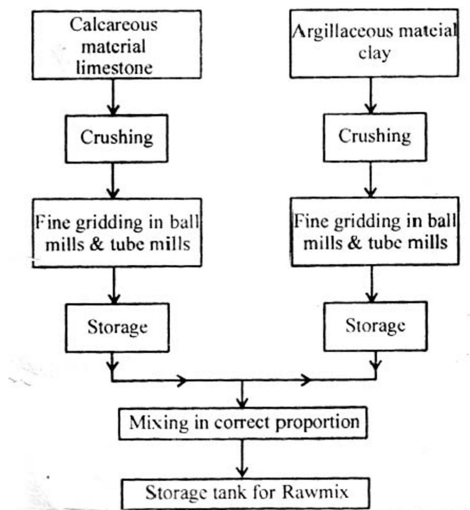
**Manufacturing of Cement :**

Following the manufacture of normal setting ordinary cement

1. Mixing of raw materials.
2. Burning.
3. Grinding.

**1. Mixing of raw material** The raw materials such as limestone and clay may be mixed either in dry condition or in wet condition. The process is known as the dry process or wet process of mixing.

**2. Dry process** - In this process, the raw materials are first reduced in size of about 25 mm in crushers. A current of dry air is then passed over these dried materials. These dried materials are then pulverised into fine powder in ball mills and tube mills. All these operations are done separately for each raw material and they are stored in hoppers. They are then mixed in correct proportions are made ready for the feed of rotary kiln. This finely ground powder of raw material is known as the raw mix and it is stored in storage tank.



**Burning**-The burning is carried out in a rotary kiln, which is formed of steel tubes. its diameter varies from 2.5m to 3m. Its length varies from 90m to 120m. It is so arranged that the kiln rotates at about one to three revolutions per minute about its longitudinal axis.

In burning tone the calcined product is formed and nodules are converted into small hard dark greenish blue bass which are known as clinkers.

**Grinding** - The clinkers as obtained from the rotary kiln are sinely ground in ball mills and tube mills. During grinding a small quantity about 3 to 4 percent of gypsum is added, which controls the initial setting time of cement.

**1.What is flyash ? Described its properties & uses [2013 (w) 2(b)]**

**Ans.** The pulverized fuel ash is commonly known as flyash.

**Properties:-** On buring nearly 30% of coal is converted in t ash, 75% of which is fine flyash & the rest is coarse bottom ash.

→ The flyash through the chimneys & discharges through the chimneys can be minimized by installing & proper working of fabric filtors mechanical dust collectoral electrostatic precipitators.

→ Normally the flyash contains some unburnt carban. It is acidic in nature its main constituent are silica alumina oxide etc.

**Uses**

- i. Addition to mass concrete.
- ii. Cellular concrete blocks.
- iii. Fly ash building bricks.

**7-Marks**

**1. Explain the term bulking how its presence affect the cement mortar proportion? [2017 (w) Q4]**

**Ans.** Bulking of Sand :- The presence of moisture in sand increase the volume of sand. This is due to the fact that moisture cause film of water around sand particles which results in the increase of volume of sand.

- For a moisture content of sand about 5 to 8 percent this increase of volume may be as much as 20 to 40 percent depending upon the grading of sand.
- The finer the materials the more will be the increase in volume for a given moisture

The phenomenon is known as the bulking of sand.

\*When moisture content is increased by adding more water, the sand particles pack near each other and the amount of bulking of sand is decreased. Thus the dry sand and the sand completely flooded with water have practically the same volume.

#### 2 Marks

1. **What do you mean by curing of concrete ? [2013 (w) 6(a)] [2013 (w) 3(a)],2018 (7)a**

**Ans.** The concrete surface are kept wet for a certain period after placing to concrete so as to promote the hardening of cement known as curing of concrete.

1. **Describe various characteristics of fresh concrete ? [2014 (w) 4(b)] [2015 (w) 5(b)]**

**Ans.** Characteristics of fresh concrete.

- It has a high compressive strength.
- It is free from corrosion & there is no effects of atmospheric agents on its.
- It is proved to be more economical than steel.
- It binds rapidly with steel & as it is weak in tension.
- It forms a hard surface capable of resisting abrasion.
- It has a tendency of porous.

2.**What are the factors responsible for deterioratio of concrete and how it can be prevented. [2013 (w) 3(c)] [2015 (w) 1(c)] [2015 (w) old 2(c)]**

**Ans.** Following are the factors responsible for deterioration of concrete.

1. **Tendency of concrete to Shrink :-**

This is due to loss of water through forms absorption by surface of forms. This can be prevented by proper curing of concrete.

2. **Tendency to be porous :-**

This is due to the presence of voids which are formed during and after its placing. This can be presented by proper grading and consolidating of aggregates and maintaining minimum water cement ratio.

3. Quality of cement aggregate steel water the quality of concrete may determinate due to poor quality of construction material. This can be prevented by adopting standard material after quality testing.

4. Improper mixing of the ingredient protionating and improper mining of cement aggregate sand leads to poor quality of concrete. This can be prevented by mixing concrete in machines

#### 6 Marks

1. **Describe various characteristics of fresh concrete. [2014 (w)2(b)]**

**Ans.** Characteristic of fresh concrete.

- It has a high compressive strength
- It is a high from corrosion & there is no appreable effect of atmospheric agents on it.
- It hardens with age & the process of hardening continues for a long time after the concrete has attained sufficient strength.
- It is proved to be more economical than steel
- It binds rapidly with steel & as it is weak in tension.

- It forms a hard surface capable of resisting abrasion.

### 7Marks

#### **1.DESCRIBED THE FOUR METHODS ADOPTED FOR WATER PROOFING OF RCC FLAT ROOFS. 2013(W)7 (C)**

- Following are the four methods adopted for water-proofing of R.C.C. flat roofs.
- 1. Finishing.
- 2. Bedding concrete and flooring.
- 3. Mastic asphalt and jute cloth.
- 4. Use of water-proofing compounds.
- **1. Finishing-** For ordinary buildings of cheap construction the finishing of roof surface is done at the time of laying cement concrete. The finishing of flat roof is carried out in cement mortar of proportion 1 : 4 i.e. one part of cement to four parts of sand by volume.
- **2. Bedding Concrete and Flooring** - In this method, the surface of R.C.C. slab is kept rough and on this surface, a layer of concrete is laid. The concrete may be brickbats lime concrete (1: 2:4) or brickbats cement concrete(1: 8:14). The thickness of the concrete layer is about 100 mm. The surface of the bedding concrete is provided by a suitable flooring such as tiles, terrazzo, Indian patent stone etc. A convex joint is provided at the junction of parapet wall and roof.
- **3. Mastic Asphalt and Jute Cloth-**In this method, a layer of hot mastic asphalt is laid on the roof surface. The jute cloth is spread over this layer. Then one more layer of mastic asphalt is applied so that the jute cloth is sandwiched between the two layers of mastic asphalt. The sand is then sprinkled over the entire surface of roof. For better grip, the lead sheets are inserted at the junction of parapet wall and roof.
- **4. Use of water-proofing compounds-**Some of the water-proofing compounds like Pudlo, Impermo etc are available in the market and when such a compound is added to the cement during construction it prevents seepage, leakage and damp caused by the capillary absorption of the moisture in cement, mortar and concrete. The quantity of water-proofing compound to be added is also very small, say 2% and thus a bag of cement will require only about 100g of such compound.
- **Explain the term water cement ratio. How it can be affected the strength of concrete.**
- **Water cement ratio :**
- The water in concrete has to perform the following two functions:-
- (i) The water enters into chemical action with cement and this action causes the setting and hardening of concrete.
- (ii) The water lubricates the aggregates and it facilitates the passage of cement through voids of aggregates. This means that water makes the concrete workable.
- It is found theoretically that water required for these two functions is about 0.50 to 0.60 times the weight of cement. This ratio of the amount of water to the amount of cement by weight is termed as the water-cement ratio and the strength and quality of concrete primarily depend upon this ratio.
- The quantity of water is usually expressed in litres per bag of cement and hence the water-cement ratio reduces to the quantity of water required in litres per kg of cement as 1 litre of water weighs 1 kg. For instance, 1 litre of water required for 1 bag of cement is 30 litres, the water-cement ratio is equal to 0.60.
- The important points to be observed in connection with the water-cement ratio are as follows:
- The minimum quantity of water should be used to have reasonable degree of workability. The excess water occupies space in concrete and on evaporation, the voids are created in concrete. Thus the excess water affects considerably the strength and durability of concrete. In general, it may be stated that addition of one extra litre of water to the concrete of one bag of cement will reduce its strength by about 1.47 N/mm<sup>2</sup>. In other words, the strength of concrete is inversely proportional to the water-cement ratio.



**Chapter – 4**  
**2Marks**

---

**1. WHAT IS SEASONING IN TIMBER ? [2013 (W) 4(A)] [2014 (W) 5(B)]**

**Ans.** The process of drying of timber is known as seasoning of timber. The main objective of  
**6 marks**

**1. DESCRIBE BRIEFLY THE PROCESS OF PAINT OF NEW WOOD WORK. (2015-3(B) 2014 6(B))**

The process of painting depends on the nature of the surface to be painted. A brief Description of painting on each of the various surfaces is given below:

**(1) New woodwork:** Normally four coats of paint are required for new woodwork the process of painting is carried out as follows:

(i) The surface of woodwork is prepared to receive the paint. For satisfactory working it is necessary that the woodwork is sufficiently seasoned and it does not contain more than 15 percent moisture at the time of painting. The surface of woodwork is thoroughly cleaned and the heads of nails are punched to a depth of 3mm below the surface.

(ii) The surface of the woodwork is then knotted.

(iii) The priming coat is then applied on the surface of new woodwork. Generally, the priming coat is applied before the woodwork is placed in position.

(iv) The process of stopping is then carried out.

(v) The subsequent coats of paint, namely, under coats and finishing coats. Are then applied on the surface the extreme care should be taken to see that the finishing coat presents smooth and even surface and that no brush marks are seen on the finished work.

**8 Marks**

**1. Describe major defect of timber with the help of neat sketch ? [2015 (w) 2(c)],2017**

**Ans.** Defects of timbers.

1. Defects due to nature force.
2. Defects due to insects.
3. Defects due to fungus.
4. Defects due to seasoning.
5. Defects due to conversion.

**1. Defects due to Nature Force:-**

The main nature responsible for defecting timber are abnormal growth and brautere in tissue.

**b. Course Grain:-**

- i. If a tree grows rapidly the annual rings coindere.
- ii. It is known as course grain timber.

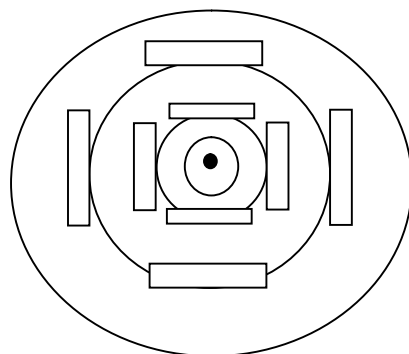
**c. Dead wood:-**

The timber which is obtained from a dead standing tree contains dead wood.

**d. Knots :-**

These are the basic branches which are broken or cut off from the stem for a long time.

- e. **Toxiness :-**  
It indicates red or yellow colouring in wood or reddish brown spot ground the pitch of tradish colouring
- f. **Druxiness :-**  
This defects indicates by while decad spot which are hide by health woods.
- g. **Chemical Strain :-**  
The wood sometimes discolouring by the chemical section caused with it by some external agencies this known as chemical stain.
- h. **Burss:-**  
These are particularly formed tree as receues shock of injury in its young age.
- i. **Twested fiber :-**  
They are cost by twisting of young branch by fast blowing wind.
- j. **Rind Gall :-**
  - i. Rind means bark and galls indicate abnormal.
  - ii. Peculiar curve swelling found on the belly of a true are known as rind gall.
- k. **Upset:-**
  - i. These are known as rock age.
  - ii. The offset indicates woods fiber which are injury by crossing or compurtion.
- l. **Water Strain:-**  
The wood sometimes discolour when it comes into contact with water this defect usually find in converted timber.
- m. **Wind Crackers:-**
  - i. If wood exposed to atmospheres agency to exterior surface string such as shrink age result to cracks.
  - ii. These are known as wind cracks.
- n. **Shakes:-**
  - i. These are cracks which partly or completely sparate the fiber of wood.
    - a. Cub Shakes
    - b. Heart Shakes
    - c. Star Shakes
    - d. Ridial Shakes
    - e. Ring Shakes
- a. **Cup Shakes:-**
  - i. There are caused by rupture (break0 of tissue on a circular direction.
  - ii. It is a curse crackes and its separate party one annual ring from other.



**b. Heart Shakes:-**

This cracks occurs in centre of cross – Section of tree and extent from pith to sap wood in direction of modularly ray.

**c. Ring Shakes :-**

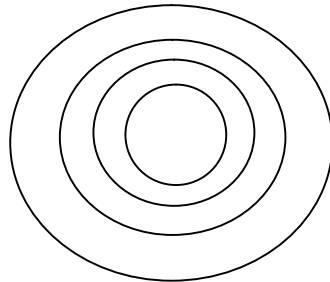
When cup shakes covers the intier the ring they are known as ring shakes

**D. Star Shakes:-**

- i. These are crahich obtained back towards the wood.
- ii. They are usually formed due to extreme heat or sever first during the growth of tree.

**E. Radial Shakes:-**

- i. They are find irregular and numerous.
- ii. When the tree is exposed the sun for seasoning after being fall down the fibers sun for a a short distance from towards the center.



iii. Defect due to fungi:-

- i. The fungi microscopic plant organism.
- ii. They attracted timber:-
  - i. The moisture context of timber 20%.
  - ii. There are is presence of air warm suitable

iii. While rot :-

This defect is just opposite of brown rot in this case certain types of fungi attacted of wood the aperrence of a while mass consisting of collouse compound

b. Brown rot:-

- i. The term rot is used to indicate decay or dises of timber
- ii. The fungi of certain types remove cellous compound from wood and its color is brown.

iv. Dry rot:-

The fungi of certain types feed on wood and during fuding they attracted wood and comurted into dry power this is known as dry rot.

v. Blue Stain :-

The sap of wood is tered to use blue color by the action of certain types of fungi.

vi. Heart Rot:-

- i. These formed when a branch as come out of a tree.
- ii. In such a case the heart wood exposed to the attracted of atmospheric presence.
- iii. The tree became weak and it gets out hollow sound when stuck with a hammer.
- iii. Defect due to insect:-
  - 1. Marine berer
  - 2. ermite
  - 3. Bettles

1. Marine borer:-
  - a. These are generally found in salt water.
  - b. Marine borers make holes or borer tunnels in wood for taking shelter.
2. Termite :-
  - a. They are popularly known as white ants.
  - b. These insects live in colonies and they are very first to eat the wood from the core of the cross section.
3. Beetle:-
  - a. These are small insects and they cause rapid decay of timber.
  - b. They form pin holes of size about 2mm diameter in wood.

Defect due to seasoning :-

- i. Bow:-  
These defects indicate by the curvature from end to end along the length of the timber.
- ii. Check:-  
A check is a crack which separates the fibers of wood.
- iii. Collapse:-  
Due to uneven shrinkage the wood sometimes flattens during this is known as collapse.
- iv. Cup:-  
These defects are indicated by curvature from top to bottom across the width of the timber.
- v. Defect due to conversion:-
  - i. Ware:-  
The defect is denoted by the presence of original rounded surface on the manufacture of a piece of timber.
  - ii. Torn Grain :-  
This defect is formed when a small depression is formed on the finished surface of timber.

### 1. DESCRIBE THE DIFFERENT METHODS ADOPTED FOR PRESERVATION OF TIMBER ? 2013-4(C)

Method for preservation of timber.

The preservation of timber is carried out to achieve the following three objectives.

1. to increase the life of timber structures.
2. to make the timber structures durable and
3. to protect the timber structures from the attack of destroying agencies such as fungi, insects etc.

**Types of Preservatives** - Following preservatives are commonly used for the preservation of timber.

1. Ascu treatment
2. Chemical salts
3. Coal tar
4. Creosote oil
5. Oil paints
6. Solignum paints

**1. Ascu treatment** The Ascu is a special preservative which is developed at the Forest Research Institute, Dehradun. Its composition is as follows.

- i. Part by weight of hydrated arsenic pentoxide  
( $As_2O_5, 2H_2O$ )
- ii. Parts by weight of blue vitriol or copper sulphate, ( $CuSO_4, 5H_2O$ )

iii. Parts by weight of potassium dichromate ( $K_2Cr_2O_7$ ) or sodium dichromate. ( $Na_2Cr_2O_7 \cdot 2H_2O$ )

The material is available in powder form. To prepare a solution of this material, six parts by weight of ascu are mixed in 100 parts by weight of water. The Solution is then sprayed or applied on timber surface.

This preservative gives timber protection against the tack of white ants. The surface treated with this preservative can be painted, polished, varnished or waxed, the solution is odourless.

**2. Chemical Salts-** These are water-borne preservatives and they are mostly salts dissolved in water. The usual salts used are copper sulphate, mercury chloride, sodium fluoride and zinc chloride. The solutions are prepared from these salts and they are applied on the timber surface. These preservatives are odourless od non-inflammable. The treated surface can be painted varnished after drying.

**3. Coal -** The timber surface is coated with hot coal tar with the help of brush. The coal tar becomes workable when heated. The process is known as the strring. The coal tar has unpleasant smell appearance. It makes timber unsuitable for painting.

#### 4. BRIEFLY EXPLAIN THE MANUFACTURING PROCESS OF PLYWOOD 2015(W) 4(B)

**Plywoods** (IS: 303-1959): The meaning of term p1 is a ply is a thin layer. The plywoods are boards which which are prepared from thin layers of wood or veneers. The three or more veneers in odd numbers are placed one above the other with the direction of grains of successive layers at right angles to each other. They are held held in position by application of suitable adhesives. The placing of veneers normal to each other increases the longitudinal and transverse strengths of plywoods.

While being glued, the pressure may be applied on veneers. The pressure may either be applied hot or cold. For hot pressure, the hydraulic press is employed to press plywoods. The temperature varies from  $150^{\circ}C$  to  $260^{\circ}C$ . For cold pressure the plywoods are pressed at room temperature only. The pressure applied on plywoods varies from  $0.70$  to  $1.40 N/mm^2$ .

. The temperatre varies from emplos ed to pi CSS )l', woods. 'l he teutipeliltuire varies ft otu l 50( to 260" ( . Foi cold pressure, the ph ywoods are pi essed at room tern perat ore only. The pressure app! ted on l)' woods varies fit mi 0. 7() to l .40 N/mm 2.

The plywoods are used for various purposes such as ceilings, (tools, furniture, partitions, panelling walls, packing cases, railway coaches, formwork for conerete, etc. The plywoods however are not suitable in situations subjected to direct shocks or impacts. The use of plywood and its products has become so common at present that it has totally changed the design and complex of various structures such as building offices, theatres, restaurants, churches, temples, hospitals etc.

The plywoods are available in different commercial forms such as battern board lamin board, metal faced plywood, multiply, three ply veneered plywood etc.

The batterboard is a solid with core of sawn thin wood as shown in fig 9-22.

The thickness of core is about 20 mm to 25 mm and total thickness of board is about 50 mm. The direction of the grains of core battens is at right angles to that of the adjacent outer ply sheets. These boards are light and strong. They do not crack or split easily. They are widely used for making partition walls, packing cases, furniture pieces, ceilings, shutters of doors and windows, etc.

**Chapter – 4**  
**2 Marks**

**1. What is Seasoning of timber ? [2013 (w) 4(a)],2018 3(c)**

**Ans.** The process of drying of timber is known as seasoning of timber the main objective of seasoning is to remove moisture, that the timber can be used for engineering purpose.

**2. What is the role of solvents in a points ? [2013 (w) 5(a)] [2015 (w) 7(a)]**

**Ans.** The function of a solvents is to make the point thin so that it can be easily applied an the surface. It also helps the point in penetrating through the porous surface.

**Ch-5**

**1. What are the advantage of painting ? [2013 (w) 6(b)] [2015 (w) old 6(b)],2018**

**Ans.** Advantage of painting.

- It protects the surface from weathering effects of the atmosphere & action by other liquids, fumes & gases.
- It prevents decay of wood & carrasion in metal.
- it is used to give good appearance to the surface.
- Decorative effect may be create by pointing & the surface becomes hygienically good clean, colour full and attractive
- If provides a smooth surface to easy clean.

**2. What are the characteristics of an ideal paint ? [2012 (w) 7(b)]**

**Ans.**

1. It should possess a good spreading power.
2. The paint should be fairly cheap & economical.
3. The paint should form a hard & durable surfaces.
4. The paint should not be affected by weathering action of atmosphere.
5. The paint should possess attractive of pleasing appreance.
6. The paint should be such that it dries in reasonable time & not too rapidly.
7. The surface coated with pait should not show cracks when the paint dries.

**8 marks**

**1. What are the characteristics of an ideal paint. [2012 (w) 7 (c)]**

**Ans.** Characteristics of an ideal paint –

Following are the characteristics of an ideal paint.

1. It should posses a good spreading power i. e maximum area of the surface should be covered by maximum quality of the point.
2. The paint should be fairly cheap and economical.
3. The paint should be such that it can be easily and freely applied on the surface.
4. The paint should be such that it dries in reasonable time and not too rapidly.
5. The paint should form a hard and durable surface.
6. The paint should be such that it colour is maintained for a long time
7. The paint should not be affected health of workess suring its application.
8. The paint should not be afferated by wreathing action of the atmosphere.
9. The paint should posses attractive and pleasing appearance.
10. The surface coated with paint should not show cracks when the paints dries.

**2. What are the ingredients present in a distemper? Explain the process of distemping. [2009 (w) 6] [2015 (w) 5(c)]**

**Ans. Ingredient of a distemper**

A distemper is composed of base carrier colouring pigment and size for base the whiting or chalk is used and for carrier the water is used.

Process of distemping

The application of distempers carried out in the following way.

1. **Preparation of surface** :- The surface to receive the distemper is thoroughly rubbed and cleared. The important facts to be kept in mind are
  - i. The new plastered surfaces should be kept exposed for a period of two months or so to dry out before distemper is applied on them. The presence of dampness on the surface results in future of distemper costing.
  - ii. The surface to receive distemper should be free from any efflorescence patches.
  - iii. If distemper is to be applied in the existing distemped surface the old distemper should be removed by profuse watering.
  
2. **Coats of distemper** :- The first coat of distemper as then applied on the surface. It should be of a light tint and applied with great care. The second coat of distemper is applied after the first. Coat has dried and become hard following facts are to be remembered.
  - i. The distemping should be done in dry weather to achieve better results.
  - ii. The oil bound distemper or washable distemper adheres well to oil painted walls wood corrugated iron etc. But a priming coat of pure mud should be applied before distemping is done on such surface.

**1. Differentiate between cast iron & wrought iron. [2018 (w) 6(a)] [2015 (w) 5(a)]**

**[2014 (w) 7(a)]**

Ans.

Cast iron

- It is hard & brittle
- It is fusible
- It is melted at 1250°C

Wrought iron

- It is ductile & malleable
- It fuses with difficulty
- It is melted at 1500°C

**1. NAME TWO STEEL ALLOY 2014(7A)**

Steel alloys are cobalt steel, copper steel, nickel steel Tungsten steel etc

**6 Marks**

**1. Distinguished between metal & alloy. [2014 (w) 6(b)] [2013 (w) 5(b)]**

Ans. An alloy is an intimate mixture of two or more metals. The process for making an alloy is as follows.

- The more fusible metal is first melted in a fire clay crucible.
- The other metal or metals are then added subsequently in order of their infusibility.
- The contents are continuously stirred to form a homogeneousness.
- The molten mixture is then cast into suitable moulds & it is allowed to cool. The product so obtained is called alloy.

**2. Explain four used of cast iron . (2015(iv) 6(b))**

Following are the varieties of cast-iron & used.

- |                     |  |
|---------------------|--|
| (1) Grey cast-iron  | (5) Malleable cast-iron                      |
| (2) White cast-iron | (6) Spheroidal graphite iron or ductile iron |

- (3) Mottled cast-iron (7) Toughened cast-iron.  
(4) Chilled cast-iron

**(1) Grey cast-iron:** This is prepared from grey pig. Its colour is grey with a coarse crystalline structure. It is soft and it melts readily. It is somewhat weak in strength. It is extensively used for making castings.

**(2) White cast-iron:** Its colour is silvery s hue. It is hard and it melts with difficulty. It is not easily worked on machine. It cannot be used for delicate casting.

**(3) Mottled cast-iron:** It is an intermediate variety between grey cast-iron and white cast-iron. The fracture of this variety is mottled. This variety is used for small castings.

**(4) Chilled cast-iron:** The chilling consists of making some portion of cast iron hard and other portion soft. This variety of cast-iron is hard to a certain depth from the exterior surface and it is indicated by white iron. The interior poi of .the body of casting is soft and it is made up of grey iron. It is used to pi (dQ wearing surfaces to the castings.

**(5) Malleable cast-iron:** The composition of this variety of cast-iron is so adjusted that it becomes malleable. It is done by extracting a portion of carbon from cast iron, which makes it less brittle than cast-iron. The process of manufacturing is known as malleable cast iron process. In this process, the individual castings are the cast and cooled as ordinary white cast-iron. Then it is heated to about 1050<sup>0</sup>C and soaked for several hours or days followed by slow cooling. During whole process the combined carbon is reduced and graphite is precipitated as temper carbon. It is used for railway equipments, automobiles, pipe fittings, agricultural implement door fastenings, hingers, etc.

## PART-II

### CHAPTER – 1

#### Short type

##### **1- What is hazardous building?[ 2013(w)1/a],2018(w)1(a)**

Ans.- Hazardous buildings include any building or part of a building which is used for the storage, handling, manufacture or processing of highly combustible or explosive materials or products which are liable to burn with extreme rapidly and or which produce poisonous fumes or explosions.

#### CHAPTER -2

##### SHORT QUS.

##### **1- State the purpose of site reconnaissance ?[2017(w)2018(w)]**

Ans.- The purpose of site reconnaissance is for getting the data w.r.t. the following item.

- Behavior of ground due to variations on depth of water table.
- Disposal of storm water at site.
- Nature of soil by visual examination.
- Movement of ground due to any reason etc.

##### **3- What are the objectives of site investigation ? [2017 (w)]**

Ans.- The purpose of site investigation is to physically observe a property and adjacent properties. It identifies any hazardous environmental ordinates.



### **Medium question**

#### **1. Explain about exploration. Why it is essential? [2014(W) 7/ b]**

The field & laboratory investigation required to get essential information, is known as site exploration.

The method of site exploration are follows—

- Test pits
- Probing
- Augur boring
- Test piles
- Wash boring

Site exploration is a essential for following reasons:-

- To fix the value of state bearing capacity to soil.
- To select an economical & safety foundation.
- To fix the depth upto which the foundation must be taken inside the ground.
- To know the underground water level & if needed, to decide upon the method to be adopted to solve the ground water problem.
- To forecast the difficulties which are likely to be encountered due to nature of subsoil during construction & to take advance action in this regard.

## **CHAPTER – 2**

### **SHORT QUS.**

#### **1- Differentiate between shallow foundation from deep foundation ? [2013(w)],2017(w),2018(w)**

Ans.-

- If it is possible to constant foundation of a building at reasonable shallow depth the foundation are termed as the shallow foundation.
- Deep foundations are those in which the depth of foundation is very large in comparison to its width.

### **MEDIUM QUS.**

#### **1- Describe with neat sketches the various types of shallow foundations. [2013(w)5/c],2018 7©**

Ans.- Shallow foundation :-

When the foundation is placed immediately beneath the lowest part of the superstructure. The object of this type of foundation is to distribute the loads at shallow depth.

Spread Foundation for walls :-

These footing can be either simple or stepped the base course of these footings can be of concrete or entirely of one material. The footing consists of several courses of bricks. The lowest course being usually twice the breadth of the wall above the increased base width of the wall is achieved by providing 5Cm offsets on either side of the wall. The depth of each course is 10C.M. In case of footings of stone walls the size of offsets is slightly more than of brick wall

Stepped footing: - In a stepped ground the correct levels on which the building is to be constructed are taken. In this case stepped foundations are provided.

- The overlap between two layers of foundation concrete should be equal to the depth of foundation concrete or twice height of step whichever is greater.
- The depth of foundation concrete should be in even no of the masonry course.
- The distance of sloping surface from the lower edge of the footing should not be less than 600mm for rock.

Combined footing: - It support 2 or more columns in a row.

The footing can be rectangular in shape if both the columns carry equal loads or can be trapezoidal if there are space limitations and they are carrying unequal loads.

- Generally they are constructed of reinforced concrete.

### **CHAPTER – 3**

#### **1- What is retaining wall ? [2013(w)2/i]**

Ans.- A retaining wall is constructed to retain the artificial filling of earth.

#### **2- Define queen closer ? [2013(w)3/a]**

Ans.- Queen closer is the portion of a brick obtained by cutting a brick lengthwise into two portions. Thus a queen closer is a brick which is half as wide as a full brick.

#### **3- Define scaffolding? [2013(w)6/a]**

Ans.- When the height above floor level exceeds about 1.50m a temporary structure usually of timber is erected close to the work to provide a safe working platform for the workers and to provide a limited space for the storage of plant and building materials.

#### **4- What is king closer in brick masonry? [2014(w)2/a],2017(w)1a**

Ans.- This is obtained by cutting a triangular portion of the brick such that half a header and half a stretcher are obtained on the adjoining cut faces.

#### **6 - Distinguish between jambs & reveals. [2018(w)6/a]**

Ans.- Jambs are the vertical sides of a finished opening for the door, windows. These may be plain or splayed or may be provided with recesses to receive the frames of doors and windows.

Reveal: - These are exposed vertical surfaces left on the sides of an opening after the door or window frame has been fitted in position.

#### **7- What do you mean by toothing & racking back ? [2018(w)7/a]**

Ans.-

Toothing: - These are the bricks left projecting in alternate courses for all purposes of bonding future masonry work.

Racking: - This bond is used on thick walls. In this type of bond, the bonding bricks are kept at an inclination to the direction of wall.

#### **8- What is throating ? [2014(w)3/a]**

Ans.- Throating is the term applied to the groove cut on the underside of projecting courses of masonry in order to check the creep age of rain water from underside of projecting portion.

#### **9. What is frog & quoin?[2014(w)]**

Frog: - The depression provided in the face of brick in its manufacture is called frog.

Quoin: - The external corner of wall is called quoin.

#### **10. What do you mean by lap in brick masonry?[2014(w)]**

The horizontal distance between the vertical joint is called lap in brick masonry.

#### **Medium type**

#### **1.-What are various purposes providing wall in build?[2013(w)5/b]**

Ans.- The structure constructed to enclose an area or to support floors and roof or to divide floor area of a building into required number of rooms are known as walls.

Purposes :-

- It is provided to give privacy to residents.
- Wall supports floors and roofs of building.

- Wall divides floor area into number of room.
- Wall protects the residents from weather.
- Wall encloses the area of building.
- Wall protects from animal and gives safely from external agency.

**2. Draw neat sketches of plan and elevation of English bond of 1, 1 ½ , 2 brick thick wall. [2013(w)6/b,2014(w),2017(w)3 b**

**3.- Explain load bearing and non load bearing walls with suitable example. [2014(w)3/b],2018 (w)7 b,**

Ans.- Load bearing wall :-

The wall which supports floors or roofs and transfer load coming over them to foundation are known load bearing wall.

These walls are solid or hollow but thick in cross section.

Ex.- main wall of a building

Non load bearing: - The walls which do not support floors or roof and do take any superimposed load but should be strong enough to take their own load are known as non load bearing wall.

These walls are used for screening and partition. So as to divide the floor area into no. of rooms.

Ex.- Partition wall in lavatory.

**4.- What are objects of dressing of stone objects of dressing of stone? [2014(w)3/b]**

Ans.- The freshly quarried stone contain some moisture called quarry sap and stones in this state are quire soft for dressing job.

- The irregular and rough portion of stones are removed which decrease the weight of stone and it also facilitates easy transportation of stones.
- The local work men are well experienced in art of dressing.
- Quarry dressed stones are thus economical and reduced weight of dressed blocks results in still further economy in transportation & handling costs.

**5.- Distinguish between shoring and underpinning. [2013(w)4/b],2018(w)5 c**

Shoring: - Shoring is constructed of a temporary structure to support temporarily an unsafe structure.

- When defective walls of a building are to be dismantled and rebuilt, shoring is resorted to for supporting the floors or roofs connected to that wall.
- Shoring is necessary to support the super structure when large opening are required to be made in the main walls shoring may be essential to give support to the wall of two adjacent buildings when intermediate building is to be pull down.
- Underpinning: - The placing of new foundation below an existing foundation or the process of strengthening the existing foundation is known as underpinning of foundation.

- Underpinning is done in short lengths of 1.2m to 1.8m. Holes are cut into walls at regular intervals and entire load of wall is supported by needles which rest on sole pieces at ground level.
- The section of needle depends upon the load to be supported.

**6.- Write essential features of English bond. [2014(w)3/b]**

Ans.- The bond consists of alternate courses of header and stretcher.

- In this arrangement, vertical joints in the header courses come over each other and vertical joints in stretcher course are also in same line.
- For breaking of vertical joints, in successive course it is essential to place queen closer after 1<sup>st</sup> header in each heading course.
- A heading course should never start with a queen closer as it is liable to get displaced in this position.
- In the stretcher course, a minimum lap of 1/4<sup>th</sup> their length over header.
- Walls having their thickness equal to an even no. of half brick.
- Present the same appearance on both front & back faces.

Ex.- 1 brick wall, 2 brick wall etc.

The joints in the header course are made thinner than those in stretchers course.

**7.- Define scaffolding and mention its component parts. [2014(w)6/b]**

Ans.- Scaffold is a temporary rigid structure having platforms raised up as the building increases in height. Scaffold enables the mason to work at different stages of building and to hoist the materials for immediate use at various heights.

Its component parts are :-

- Standards: - These are the vertical members of the frame work, supported on the ground or embedded into ground.
- Ledge: - These are horizontal members, running parallel to the wall.
- Braces: - These are diagonal members fixed on standards.
- Transoms: - These are those put logs whose both ends are supported on ledgers.
- Putlogs: - These are transverse members, placed at right angles to wall with one end supported on ledgers and other end on wall.
- Boarding: - These are horizontal platforms to support workmen and material. These are supported on putlogs.

**Long qus.**

**1.- Describe briefly with neat sketches the various types of stone masonry used in building construction. [2013(w)]**

Ans.- Types of stone masonry is classified into two categories.

- Rubble masonry
- Ashlar masonry
- Rubble masonry :- The stone masonry in which either undressed or roughly dressed stone are laid in a suitable mortar is called rubble masonry.

\* In this masonry the joints of mortar are wider and also not uniform thickness.

Rubble masonry are different types.

a) Random rubble masonry :-

This masonry shows irregular shape stones with non uniform joints. The random rubble masonry is used to construct residential building, godowns and boundary wall.

- If the face stones are chisel dressed and the thickness of mortar joint does not exceed 6mm, it is known as Random Rubble masonry I sort.
- If the stones are hammer dressed and the thickness of mortar joints doesn't exceed 12mm, it is known as Random rubble masonry II sort.

b) Course Rubble masonry: - This is superior variety of rubble masonry. The stone to be laid in a course should be of equal size.

There is different types :-

First class course rubble masonry :-

- In this case, the stones of same heights are used and course are also of the same height.
- Face stones are dress by mean of hammer and bushing does not projecting by more than 40mm.
- The thickness of mortar joint should not exceed 10mm.

2<sup>nd</sup> Class course rubble masonry :-

- To make up the height of one course, two stores are used.
- The stone to be used different height mortar joint is 12mm.

3<sup>rd</sup> Class course rubble masonry :-

- The stores to be used are of different heights, the minimum being 50mm.
- Only 3 stores are to be used to make up the height of one course. Thickness of mortar joint 16mm.

Ashlar masonry: - The stone masonry having finally dressed stones laid in cement or lime mortar is known as Ashlar masonry.

- All the courses are uniform height.

There are different types :-

Ashlar fine masonry :-

In this type masonry, the beds sides and faces are finely chisel dressed.

The stone are arranged in proper bond and thickness of mortar joint does not exceed 3mm.

Ashlar Rough tooled Masonry :-

In this type of masonry the bed sides are finely chisel dressed but the face is made rough by means of tools.

Ashlar facing: - In this type, the facing is constructed on ashlar masonry and backing may be brick masonry and backing may be brick masonry, rubble masonry & concrete masonry.

## **SHORT QUS**

### **1.- Explain D.P.C. (2014(w)5/a]**

Ans.- It is a water repellant membrane which is provided between the source of dampness and part of building adjacent to it to prevent entry moisture in the building It consist of flexible material such as bitumen, mastic asphalt, bituminous felt, plastering, metal sheet, cement concrete etc.

## **Medium Question**

### **1.- Write own the various effects of dampness in a building. [2013(w)1/b],2017 1b,2018 2©**

Ans.- Effects of Dampness – The following are the ill effects of entry of dampness.

- Dampness gives rise to breeding of mosquitoes and create unhealthy living conditions.
- Travel of moisture through walls and ceiling may cause unsightly patches.
- Moisture travel may cause softening and crumbling of plaster, specially lime plaster.
- The wall decoration (i.e. painting etc.) is damaged which is very difficult and costly to repair.
- Continuous presence of moisture in the walls may cause efflorescence resulting in reduction in strength.
- The flooring gets loosened because of reduction in the adhesion when moisture enters through the floor.
- Timber fittings, such as doors, windows, wardrobes etc., coming in contact with damp walls, damp floors etc., get deteriorated because of warping, buckling, dry rotting etc. for timber.

- Electrical fittings get deteriorated, giving rise to leakage of electricity and consequent danger of short circuiting.
- Floor coverings are, damaged on damp floors, one can not use floor coverings.
- Dampness promotes and accelerates growth of termites.

### LONG QUS.

#### 1.- Compare and contrast the principle of construction of stone masonry and brick masonry.[2013(w)5]

Ans.- Brick masonry :-

- Brick work is cheaper at places where stones aren't available.
- Generally brick masonry can be constructed with less skilled mason in comparison to stone work.
- Bricks are easy to handle. They can be lifted by manual labour. No special lifting arrangement is required.
- Brick masonry can be constructed in any type of mortar.
- Bricks are regular shape and size. Due to this proper bond can be maintained stones required dressing for maintaining bond.
- Brick work requires lesser mortar as comparison stone.
- Bricks are better fire resistance than stone masonry.
- The dead load of walls is much less in brick masonry than on the stone masonry.

Stone masonry :-

- Stone masonry stronger than brick masonry of the same wall thickness.
- The life of stone masonry as much more than brick masonry.
- Stone work gives massive appearance.
- Better architectural effect can be given in stone work.
- Stone work more water tight than brick masonry.

#### 2.- Write different methods of damp proofing [2013(w)4/c]

Ans.- Methods of damp proofing

1. Use D.P.C. membrane damp proofing.
2. Integral Damp proofing.
3. Surface treatment
4. Cavity wall construction
5. Guniting

##### i. Membrane damp proofing :-

This consists of introducing a water repellent membrane of D.P.C. between the source of dampness and part of building adjacent to it, D.P.C. may consist of flexible materials. Such as bitumen, mastic asphalt, Bituminous felts, Plastic and polythene sheets, metals sheets, cement concrete etc.

- Damp proofing course may be provided either horizontally, vertically in floors, wall.

##### ii. Integral damp proofing :-

This consists of adding certain water proofing compounds of materials to the concrete mix, So that it becomes impermeable.

- These water proof compound may be form compound made from chalk, which may be fill the voids of concrete.
- Compound like alkaline, silicate, aluminium sulphate, calcium chloride, soap, petroleum, oils, fatty acid compound which react chemically with concrete to produce water proof concrete.

##### iii. Surface treatment :-

In order to check the entry of moisture into the pores of surface subjected to dampness.

The use of water repellent metallic soaps such as calcium and aluminium stearates is much effective in protecting the building against of heavy rain.

- Bitumen solution, cement coating, paints, vernishes fall under this category.

##### iv. Cavity wall construction :-

This consists in shield main wall of building by an outer wall leaving a cavity in between two. The cavity prevents the moisture from travel from outer to inner wall.

v. Guniting: - This consists of depositing on in pervious layer of rich cement mortar over the surface to be water proofed.

### **3. Discuss different methods of damp-proofing[2014(w)5/c]**

Ans: There are various methods of damp proofing and depending upon the nature of surface, situation of the structure and amount of dampness, the proper method is selected. Following are the methods adopted to prevent entry of dampness.

If the level of the ground floor is in level with the ground surface or just above it, the damp-proofing course is provided. The material should be flexible and it should be stepped vertically through the wall to meet the damp-proofing course of the solid floor.

- If two ground floors at different levels are connected by a internal wall, the d.p.c. may be provided as shown in figure below. It would be noted that the d.p.c. on the internal wall is in level with the lower floor level.
- In order to prevent the rising of moisture from the adjacent ground, the air drains may be provided. An air drain is a narrow hollow space which is constructed parallel to the external wall. The width of air drain is about 200 mm to 300 mm. The openings with gratings are provided at regular intervals for the passage of air. The wall forming the air drain rest on the foundation concrete of the main wall and is carried about 150mm above the ground level. The top of air drain is covered either by an R.C.C. slab or a stone and necessary arrangements are provided for the inspection of the air drain. The vertical and horizontal d.p.c. are provided.

## **CHAPTER-4**

### **Short type**

#### **1. What do you mean by arches? (1013(w))**

Ans.- An arch is a structure which is constructed to span across an opening. It generally consists of small wedge shaped units which are joined together with mortar.

#### **Medium type**

#### **1.- What are the different types of materials used in Lintel. [2013(w)7/b],2017 4a**

Ans.- The common materials used in construction of lintel are :-

- Wood or timber lintels
- Stone lintels
- Brick lintels
- Steel lintels
- Reinforced cement concrete lintels

Wood or timber lintels: These lintels consist of pieces of timber which are placed across the opening. The timber lintels are the oldest types of lintels and they have become absolute except in hilly areas or places where timber is easily available.

Stone lintels: These lintels consist of slabs of stones which are placed across the openings. The stone lintels may be formed of a single piece or more than one piece.

Brick lintels : These lintels consist of bricks which are generally placed on end or edge.

Steel lintels : These lintels consists of steel angles or rolled steel joists. The former is used for small spans and light loading and the latter is used for large spans and heavy loading. A steel lintel becomes useful when there is no space available to accommodate the rise of an arch.

Reinforced cement concrete lintels : These lintels consists of the reinforcement concrete and they have replaced practically all other materials for the lintels. The RCC lintels are fire proof, durable, strong, economical and easy to construct. No relieving arches are necessary when the RCC lintels are adopted.

**2.- What are the relative merits of lintels over arches. [2017(w)6/b]**

Ans.-

- A lintel is a horizontal member which is placed across an opening to support the portion of structure above.
- The function of lintel is same as that of an arch or a beam.
- The lintels are easy and simple to construction.
- For an arch special centering or formwork is required.

**LONG QUS.**

**1.- Draw a neat sketch of typical segmental arch show its various component parts and describe briefly segmental arch :[2018 4©]**

Ans.- Segmental arch:-

These are in the form of circular, Less than semicircular line.

The centre lies below the spring line.

It is used to avoid more rise

- Abutments :- These are the outer most or end support of an arch, from which the arch springs.
- Pier :- These are the intermediate support of a series of arches.
- Extrados :- This is inner curve of the arch.
- Intrados :- This is inner curve of the arch.
- Soffit :- This is inner or under surface of arch.
- Haunch :- This is the lower half portion of arch between crown and skewback .
- Crown :- This highest point on the extrados of an arch is known as crown.
- Skewback :- The sloping surface of a pier or abutment from where an arch spring start is called skewback.

**2.- Explain with neat sketches different types of arches commonly used in building construction. [2014 (w),3/c],2017,2018**

Ans.- Different type of arches :-

i) Semi circular arches :-

These are in the form of half circle. The centre of this arch lies in the middle of springing line.

ii) Segmental arches :-

These are in the form of circular less than semicircle. The centre lies below spring line.

It is used to avoid more rise.

iii) Elliptical arches :-

There shape is confirming to ellipse. These arches have less rise compared to span. These are used to provide. (Segmental arch architectural appearance to building, when height is restricted)

iv) Parabolic arch :-

Their shape is confirming to parabola. These arches have more rise compound to span. These are use to provide architectural appearance in the face of building.



## Medium type

### 1.- Prepare a list of different types of doors & windows. [2014(w)2/b]

#### Ans.- Types of Doors :-

- Battened and lodge doors.
- Battened, Lodged and braced doors.
- Battened, Lodged and framed doors.
- Battened, Lodged and framed doors
- Battened, Lodged, framed and braced doors
- Framed and paneled door
- Glazed door
- Flush door
- Louver door
- Collapsible steel doors
- Rolling steel shutter doors.
- Side sliding doors
- Steel plated doors.
- Hollow metal doors
- Metal covered plywood doors

#### Windows :-

- Casement window
- Ventilators
- Sky light
- Louvered window
- Glazed window
- Metal window
- Sliding windows
- Casement windows

### 4.- Differentiate between collapsible steel Door and Rolling steel Door. [2014(w)7/c]

Ans.- Collapsible Door :- These door are used for shops, garages, public building, godowns etc. and in situation where width opening is large.

- These doors are commonly recommended in situations where light and ventilation are desired even when opening is closed.
- The door shutter slides over roller maintained at its bottom and its bottom and is held in position by rails.
- It is manually operated.

Rolling steel Door :-

- These door are commonly used for shop front, godown etc.
- In this type of door no light and ventilation are not passes when it is closed.
- When the area of door opening does not exceed 10m<sup>2</sup> the door shutter can be easily opened or closed by pushing it up or down manually.
- When the area of door opening is more than 10m<sup>2</sup> the shutter is generally opened or closed by means of reduction gear operated by connecting rod and winding handle or by means of chain pulley blocks.

## SHORT QUS.

### 1.- What is meant by “dado” ? What is its objective?[2017(W) 7/a]

Ans.- Dado is defined as the lower part of the wall of a room, below about waist height, when decorated different from the upper part.

**MEDIUM QUS.**

1.- **Describe the advantages and disadvantages of concrete flooring. [2014 (w)2/c]**

Ans.- Advantages :-

- It is non absorbent and thus it is very useful for water stores.
- It is durable and hence it is commonly used in kitchens, bathrooms, schools, hospitals, drawing room etc.
- It is smooth & pleasing is appearance.
- It is economical.
- It possess good wearing properties and can be easily maintained clean.

Disadvantages :-

- Defects in carelessly made floor can not be rectified and it require proper attention while laying.
- It can not be satisfactorily repaired by patch.
- Hair crack may be developed because of settlement of freshly laid base course which has not set.

**Long type**

1.- **Describe briefly the method of construction of artificial stone flooring and terrazzo flooring. [2014(w),2017(w),2018(w)]**

Ans.- Artificial stone flooring :-

Artificial stone is any laminated sand stone available in 2 to 4 Cm.

Thickness in the form of stone slabs of square (30cm x 300cm) or rectangular size (45 x 60cm). This type of work is also called paving. The stone slabs are laid on concrete base. The sub-soil is properly compacted, over which 10 to 15cm thick lime concrete is laid. This forms the base course of the floor. The flag stones are then laid over 20 to 25 mm thick layer of bed mortar. In laying the slabs, work is started from two diagonally opposite corners & brought up from both sides.

Terrazzo flooring –Terrazzo is a mixture of cement & marble chips & the surface polished with carborandum stone to obtain a smooth finish at top. The base for this type of floor covering is concrete & laid in the ordinary way. On the 3cm concrete base, a thin layer of sand is sprinkled evenly & it is covered by tarred paper. A layer of rich mortar is spread over it & then terrazzo mixture is placed over it evenly. Marble chips of 3 to 6mm are mixed with white or coloured cement in proportion 1: 2 or 1:3 to get the terrazzo mixture. The terrazzo is leveled in position by trowel.

When the terrazzo has hardened, the surface is rubbed by coarse & fine carbonadum stones respectively to get a smooth finished surface. It is kept wet with water while robbing. The surface is cleaned with water & soap solution & then wax polish is applied to the surface. This type o floor covering is very costly & is used to obtain clean, attractive & durable surface in public buildings, hospitals, bath rooms etc.

**CHAPTER – 5**

1.- **State use of principal rafter. [2014(w)4/a]**

These are the piece of timber which extend from the caves to ridge. Which gives support to purlin.

2.- **Differentiate between purlin & rafter.**

Ans.- These are horizontal wooden or steel member used to support common rafter of a roof when span is large purlins are supported on trussed or wall

## LONG QUS

### 1.- Describe material used for flat and pitched roof . (2013(w)3/C]

Ans.- Following are the types of roof covering which are commonly used for pitched roof.

#### Thatch roof :-

- This is very light roof covering. But it is combustible absorbs moisture rapidly and is easily liable to decay. It is unstable against high winds.
- The Thatch is generally used in rural areas because it is cheapest.

#### Ordinary Half round country Tiles :-

- These are used for cheap buildings.
- Tiles are laid in two layers, the roof is known as a double tiled roof.
- A overlap of at-least 80mm should be
- Provided when these tiles are used.

Shingles :- The wood shingle are obtained from well season timber with lengths varying from 800mm to 380mm width varies from 60mm to 250 mm

- This wood is easily and cheaply available.

#### Patent tiles :-

- The various patent tiles are available which can be used as roof covering.
- These tiles are red in colour and made of double channeled mangalor pattern.
- These are called mangalor tiles.

#### Corrugated Galvanied Iron sheet :-

- The galvanized iron sheet are prepared by pressing flat wrought iron plates between rollers with wrought iron plates between rollers with grooves or teeth and then they are galvanized with a coat of zinc.
- These sheets are commonly known as galvanized iron sheet or G.I. sheet.
- The corrugations help to increase strength and they permit easy flow of rain water.

#### Asbestos cement corrugated sheets :-

- The cement is mixed with about 15% of asbestos fibers and the paste so formed is pressed under rollers with grooves and teeth.
- The sheets commonly known as A.C. sheet with a series of waves or corrugations are formed and they are used for factories, workshops, garages etc.

#### Water proofing of flat Roofs :-

- All the flat roofs in modern ages are constructed of reinforced cement concrete. The flat roofs should be made water proof by employing any one of the following four methods.
  - i) Finishing
  - ii) Bedding concrete and flooring
  - iii) Mastic asphalt
  - iv) Use of water proofing compound

### 1. What is baluster ? [2013(w)4/a],2017 (w) 6a

Ans.- This is the vertical member which is fixed between string & handrail to give support to the handrail.

### 2. Distinguish between headroom & mumty room. [2018(w)3/a]

Ans.- Head room is the carpet room of a building mumty room is the room only including stair case.

## Long type

### 1.- Name various types of stair cases used in building with neat sketches.[2013(w)3/c],2018

Ans.- Types of stairs :-

a)Straight stairs

- b) Turning stairs
- c) Circular or helical or spiral stairs
- d) Geometrical stairs

a) Straight stairs :-

In this case all steps lead in one direction only as shown in figure. This type of stair may consist of one or more flights and they are used when space available for staircase is long but narrow is width.

b) Turning stairs – In case of turning stairs the flights take turn. The usual types of turning stairs are described below.

i) Quarter turn stairs – A stair turning through a right angle is known as a quarter-turn stair. It is known as a bifurcated stair. This type of stair is commonly used in the public building near their entrance hall.

ii) Half turn stairs – A stair turning two right angles is known as a half-turn stair. A half turn stair may be of dog legged or open newel type as shown in figure. In case of doglegged stair, the flight runs in opposite direction and there is no space between them in plan.

- In case of an open newel stair, there is a well or hole opening between the flights in plan.

(iii) Three quarter turn stairs – A stair turning through three right angles it known as a three quarter turn stair as shown in figure. In this case, an open well is formed, this type of stair is used when the length of the stair is used when the length of the stair case is limited and when the vertical distance between the two floors is large.

c) Circular or Helical or spiral stairs :-

In this type of stair, the steps radiate from the centre & they don't have either a landing or any intermediate newel post.

d) Geometrical stairs :-

These stairs have any geometrical shape & they require no newel posts. The hand rail of a geometrical stair continues without interruption & without any angular turn.

**MEDIUM TYPE**

**1. What is the objective of plastering? Name various types of plasters & requirement of good plaster. [ 2013(W) 2 / c]**

Plastering is the process of covering rough surface of walls, column, ceiling & other building component with thin coat of plastic mortars to form a smooth durable surface. The coating of plastic material is called plaster.

Objective of plastic

- To protect the external surface against penetration of rainwater & other atmospheric agencies
- To give smooth surface in which dust & dirt cant lodge.
- To give decorative effect

Requirement of good plaster

- It should adhere to the back ground & should adhere during all variation in season & atmospheric condition.
- It should be hard & durable
- It should possess good workability
- It should be cheap
- It should be possible to apply it during all weather condition

Types of good plaster

- Lime mortar
- Cement mortar
- Lime cement mortar

**3. Write the procedure of painting on new steel surface. [ 2014(W) 4 /b]**

Painting of new iron & steel involves the following steps

- Before applying paint, the surface of iron steel should be well prepared. The surface is cleaned of all dirt, dust scales grease etc. It should be cleaned by gasoline or benzene or lime water.
- The cleaned surface is then treated with phosphoric acid which serves two functions, firstly this acid film protects the surface from rusting & secondly offers a better adhesive surface for the paint.
- After preparing & cleaning the surface the first coat of paint is applied with a brush. Fine red powder is used for this purpose.
- After thoroughly drying of the first coat two or more coats of described paint are applied over the primed surface with brush or spray gun. The second coat usually consists of boiled linseed oil. The third coat consists of 3.5 kg of red oxide & 5 litre of boiled linseed oil.
- After complete drying of under coat, the finishing coat of red – oxide paint or aluminium paint is used.