FAQ's

1. **What are the processes in preparation of clay? Explain.**

Preparation of clay is done manually or by mechanically operated machines (excavators). Preparation of clay consists of following methods:
Un-soiling: Un-soiling is the process of removal of top layer soil which consists of vegetation, Kankar or other impurities.
Digging: Digging is the process of excavation of clay. It is done manually by tools or by machines such as excavators.
Cleaning: Cleaning is the removal of impurities such as stones, Kankar and garbage materials. It is done by hand-picking method or by sieves.
Weathering: Weathering is done to get the adequate amount of moisture in clay. In this method clay is spread in the form of layers (600 to 1200 mm) and exposed to atmosphere for natural drying for at least 30 days. Weathering provides proper texture and plasticity to clay.
Blending: Blending is the process of mixing other constituent materials such as chalk, sand, limestone etc. to clay. This provides desired characteristics to clay.
Tempering: Tempering is to knead the clay into a homogeneous mass with uniform consistency. Kneading can be done manually or by machines.

2. **What is moulding and what are the different ways to mould Bricks? Explain.**

Moulding is the process of giving desired shape to the tempered clay. In the molding process, prepared clay is mold into brick shape (generally rectangular). This process can be done in two ways according to scale of project.

a. Hand molding (for small scale)
b. Machine molding (for large scale)

Hand molding of bricks

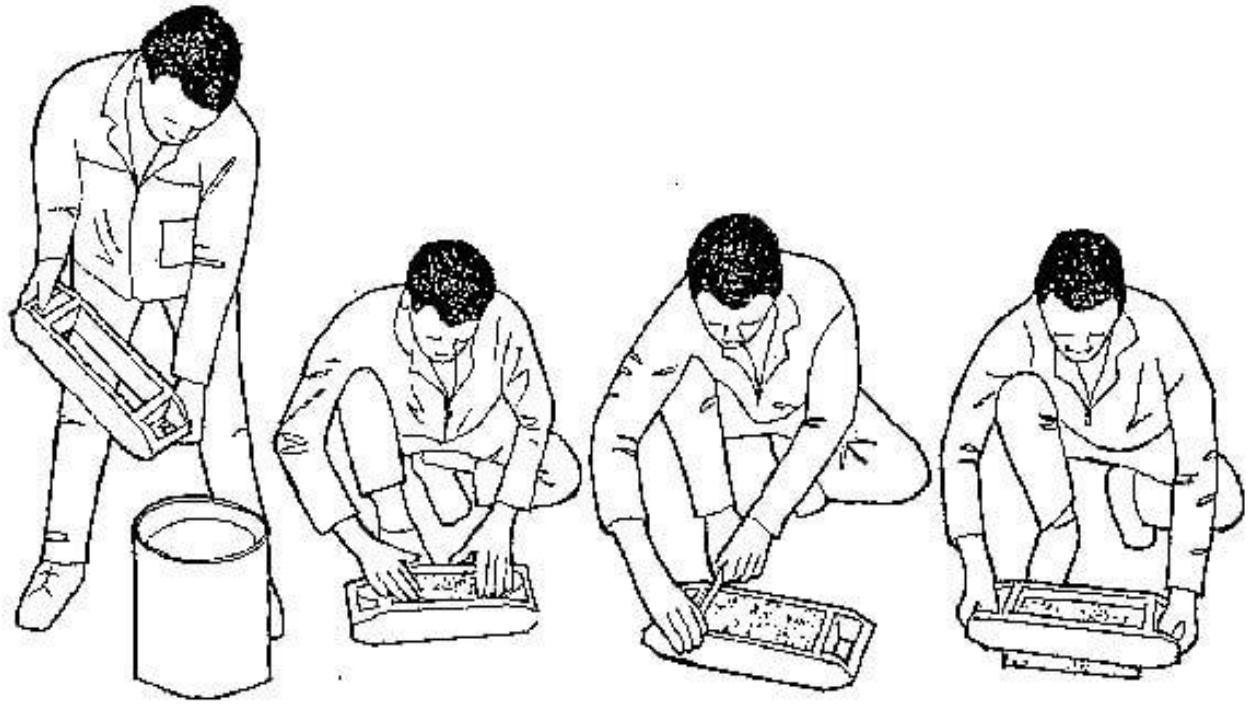
If manufacturing of bricks is on a small scale and manpower is also cheap then we can go for hand molding. The molds are in rectangular shape made of wood or steel which are opened at the top and bottom. The longer sides of molds are projected out of the box to serve it as handles. If we take durability in consideration steel molds are better than wooden molds.
In hand molding again there are two types and they are
Ground molded bricks
Table-molded bricks
Ground molded bricks
In this process of ground molding, first level the ground and sand or ash is sprinkled over it.
Now place the wet mold in the ground and filled it with tempered clay and press hard to fill all corners of the mold. Extra clay is removed with metal strike or wood strike or with wire.
The mold is then lifted up and we have raw brick in the ground. And again wet the mold by dipping it in water and repeat the same process. The process of dipping mold every time to make bricks is called slop molding.
Sometimes, the inside surface of mold is sprinkled with sand or ash instead of dipping in water this is called sand molding
Frog mark of bricks are made by using a pair of pallet boards. Frog mark means the mark of depth which is placed on raw brick while molding. The depth may be 10mm to 20mm.

Frog mark stats the trademark of manufacturing company and also it is useful to store mortar in it when the bricks is placed over it.

Table molded bricks

This process is similar to ground molding process, but here the bricks on molded on the table of size 2m x 1m.

Ground molding is economical when compared to table molding.



Machine molding of bricks

The bricks required are in large quantity, then machine molding is economical and also saves more time. Here also we are having two types of machines,

Plastic clay machines

Dry clay machines

Plastic clay machines

This machines contain an opening in rectangular shape and when we place the tempered clay in to this machine it will come out through this opening. Now, the rectangular strips coming out the opening are cut by wires to get required thickness of brick. So, these are also called wire cut bricks. Now these raw bricks are ready for the drying process.

Dry clay machines

Dry clay machines are more time saving machines. We can put the blended clay into these machines directly without tempering. Means tempering is also done in this machine by adding some water. When the required stiffness is obtained the clay is placed in mold and pressed hard and well-shaped bricks are delivered. These are called pressed bricks and these do not require drying they may directly sent to burning process.

3. What is Drying of Bricks? Why is it required? What are the different ways to Dry Bricks?

Drying is to evaporate all the moisture contained at the time of moulding without damaging the bricks and to make brick hard enough so it can

handle operations in burning. Drying is required to be done to prevent cracking while burning.

Drying can be done by 2 methods:

Natural Drying: Moulded bricks are arranged in rows called hacks with space between bricks for circulation of air. Natural drying is not desirable in monsoon season.

Artificial Drying: In this method bricks are dried artificially in heated chambers or furnaces. This method is desirable for large scale production.

After moulding process the bricks contain some amount of moisture in it. So, drying is to be done otherwise they may cracked while burning. The drying of raw bricks is done by natural process.

The drying is done in the following process:

The bricks are laid in stacks. A stack consists 8 to 10 stairs. The bricks in these stacks should be arranged in such a way that circulation of air in between the bricks is free.

The period of drying may be 3 to 10 days. It also depends upon the weather conditions.

The drying yards are also prepared on higher level than the normal ground for the prevention of bricks from rain water.

In Some situations artificial drying is adopted under special dryers or hot gases.

4. What is burning of Bricks and why is it done?

In the process of burning, the dried bricks are burned either in clamps (small scale) or kilns (large scale) up to certain degree temperature. In this stage, the bricks will gain hardness and strength so it is important stage in manufacturing of bricks.

The temperature required for burning is about 1100◦C. If they burnt beyond this limit they will be brittle and easy to break. If they burnt under this limit, they will not gain full strength and there is a chance to absorb moisture from the atmosphere.

Hence burning should be done properly to meet the requirements of good brick.

5. What is Clamps? Explain process of burning bricks in clamps?

Clamp is a temporary structure generally constructed over the ground with a height of about 4 to 6 m. It is employed when the demand of the bricks is lower scale and when it is not a monsoon season.

Clamp Burning:

This is generally trapezoidal in plan whose shorter edge among the parallel sides is below the ground and then the surface raising constantly at about 15 degrees to reach the other parallel edge over the ground.

A vertical brick and mud wall is constructed at the lower edge to support the stack of the brick. First layer of fuel is laid as the bottom most layer with the coal, wood and other locally available material like cow dung and husk.

Another layer of about 4 to 5 rows of bricks is laid and then again a fuel layer is laid over it. The thickness of the fuel layer goes on with the height of the clamp.

After these alternate layers of the bricks and fuel the top surface is covered with the mud so as to preserve the heat.

Fire is ignited at the bottom, once fire is started it is kept under fire by itself for one or two months and same time period is needed for the cooling of the bricks.

Disadvantages of Clamp burning:

Bricks at the bottom are over-burnt while at the top are under-burnt.

Bricks loose their shape, and reason may be their descending downward once the fuel layer is burnt.

This method cannot employed for the manufacturing of large number of bricks and it is costly in terms of fuel because large amount of heat is wasted.

It cannot be employed in monsoon season.

6. **Explain briefly the construction and working of bull's Trench kiln?**

It is a continuous kiln generally oval in plan. It is 50 to 100 m. long and 1.5 -2.5 m deep below ground level. It is divided into 8-12 sections.

The dried bricks are stacked in the kiln with spaces in between them for circulation of hot gases and forming fuel galleries over which vertical shafts at 60-90 cm interval are provided to provide fuel. Bricks are stacked in section of about 3.60 m length having 20-30 thousands bricks in a section.

When one section is being burnt, the hot gases are allowed to pass through the next section before escaping through chimney. It takes about 24 hours to burn the bricks in one section with temperature variations of 800 -1000.So in the kiln when one section is being unloaded ,the next two sections are left for cooling, one section shall be under fire and one under pre-heating , other one in smoking while last two sections are under loading loading. But it is difficult for kiln to work in the monsoon season. Its output is about 30000 bricks a day.