3RD LECTURE

1- BUILDING MATERIAL PROPERTIES
2- CLAY AND ITS PRODUCT

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1- Material Properties

Main Properties Required For Building Materials

If you want to name anything a building material, it must satisfy certain engineering requirements. The quality and capacity of a construction material are largely determined by the some main properties, and this information is used to make design decisions. Building materials with these characteristics can be classed as follows.

1. **Physical properties**
2. Mechanical properties
3. Chemical properties
4. Electrical properties
5. Magnetic properties
6. Thermal properties

1- physical properties:-

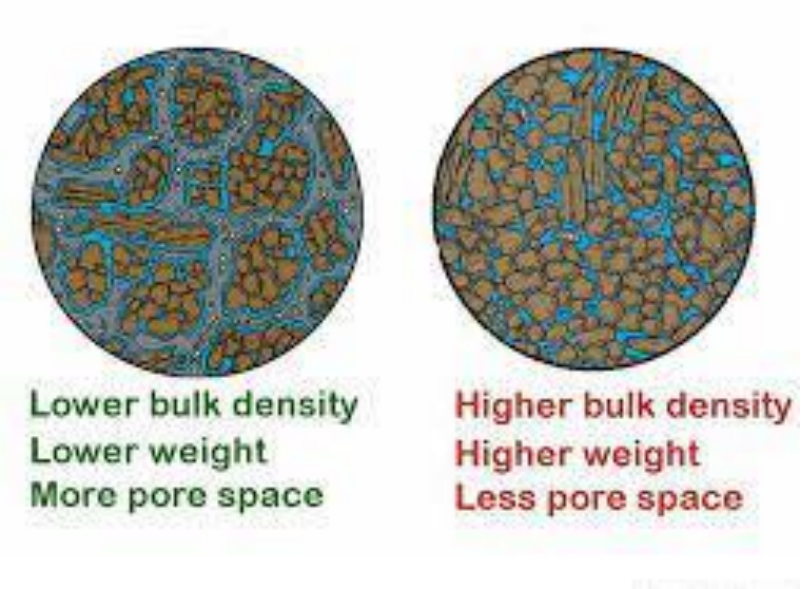
These are the properties required to estimate the quality and condition of the material without any external force. The physical properties of engineering materials are as follows.

- Bulk density
- Porosity
- Durability
- Density index
- Specific gravity
- Fire resistance
- Frost resistance

- Weathering resistance
- Spalling resistance
- Water absorption
- Water permeability
- Hygroscopicity
- Coefficient of softening
- Refractoriness

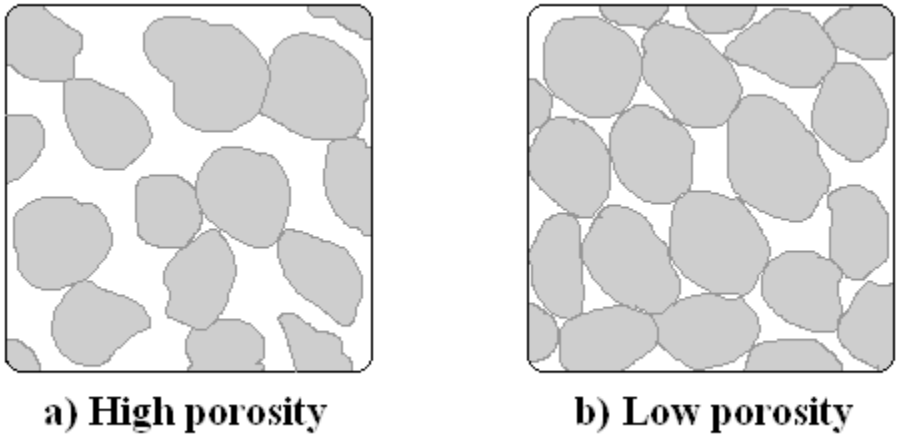
- **Bulk Density of Building Materials**

Bulk density is the ratio of mass to the volume of the material in its natural state that is including voids and pores. It is expressed in kg/m3



- **Porosity of Building Materials**

Porosity gives the volume of the material occupied by pores. It is the ratio of volume of pores to the volume of material.

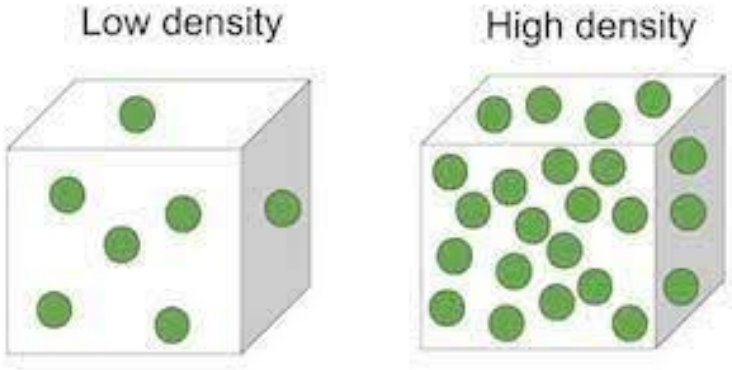


- **Durability**

The property of a material to withstand against the combined action of atmospheric and other factors is known as durability of material. If the material is more durable, it will be useful for longer life.

- **Density**

Density is the ratio of mass of the material to its volume in homogeneous state. Almost all the physical properties of materials are influenced by its density values.



- **Fire Resistance**

The ability to withstand against **fire** without changing its shape and other properties. Fire resistance of a material is tested by the combined actions of water and fire.

- **Frost Resistance**

The ability of a material to resist **freezing** is called frost resistance. It is depends upon the density and bulk density of material. Denser materials will have more frost resistance. Moist material have low frost resistance and they lose their strength in freezing and become brittle.

- **Weathering Resistance**

Resistance to all atmospheric processes without losing strength and form is a property of materials. Weathering has an impact on a material's long-term durability. Weathering, for example, causes iron to corrosion.

- **Spalling Resistance**

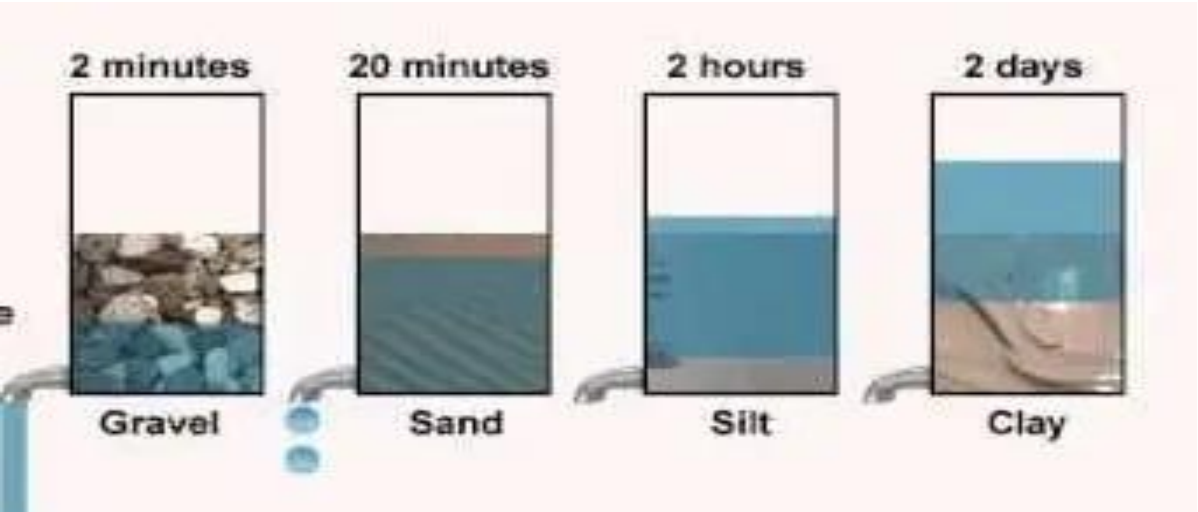
Spalling resistance is the capacity of a material to withstand a set number of cycles of extreme temperature changes without cracking. The coefficient of linear expansion is a factor in this expression.

Water Absorption

Water absorption is the ability of a material to absorb and retain water. Selection of material is represented as a percentage of total weight. The material's porosity, size, and form all have a role.

Water Permeability

The ability of a material to permit water through it is called water permeability. Dense materials like glass metals etc. are called impervious materials which cannot allow water through it.



2- Clay And its Products

- Clay products are one of the most important classes of structural materials.
- According to the method of manufacture and structure, bricks, tiles, pipes, as well as many others were recognized and employed in building construction.
- Clay bricks have pleasing appearance, strength and durability .
- Clay tiles used for light-weight partition walls and floors possess high strength and resistance to fire.
- Clay pipes on account of their durability, strength, lightness and cheapness are successfully used in sewers, drains and conduits.
- Plasticity, tensile strength, texture, shrinkage, porosity, fusibility and color after burning are the physical properties which are the most important in determining the value of clay.

What are the types of structural clay products that are used in Building Construction?

- **Brick** – Brick is extensively used in the construction of the external and internal walls of the building where they are joined with cement plaster.

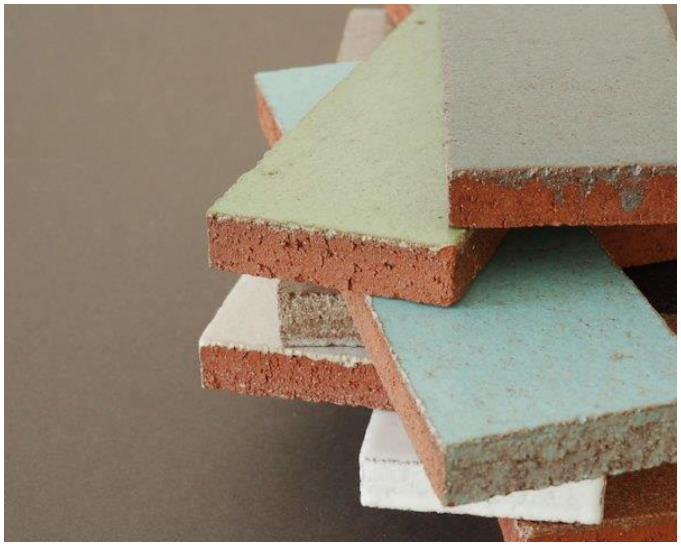
- **Terra-cotta** – It is used as a roofing material and external natural tile cladding material to create the feel of exposed brick work.

Terra-cotta Uses in Architecture

- **Hollow Brick Tile** – These tiles are used to create the external walls of the building and are very good insulators of sound and heat.

- **Paver Blocks**– These Blocks are used in driveways and landscaped gardens. They are light in weight, strong and are usually in the form of interlocking tiles.

- **Brick Glazed Tile** – Glazed brick tiles are used as an external cladding material so as to give the look of exposed brick work. The surface is glazed so as to give a nice shine to the cladding.



- **Roofing Material** – Clay is used as roofing material in many houses having sloped roofs.

Discussion Part 28.2.2023

1- physical properties:-
(Hygroscopicity
Coefficient of softening
Refractoriness)

Group A (Student) Discussion

2-Mechanical properties

Group B (Student) Discussion

3- Chemical properties

Group C (Student) Discussion

4- Electrical properties

Group D (Student) Discussion

5-Magnetic properties

Group E(Student) Discussion

6-Thermal properties

Group F&G(Student) Discussion


Q&A


THANK
YOU