



# **SNS COLLEGE OF TECHNOLOGY**



**AN AUTONOMOUS INSTITUTION**

**Approved by AICTE New Delhi & Affiliated to Anna University Chennai  
Accredited by NBA & Accredited by NAAC with “A+” Grade, Recognized by UGC**

**COIMBATORE**

## **DEPARTMENT OF CIVIL ENGINEERING**

**19CEB201 – CONSTRUCTION MATERIALS**

**II YEAR / III SEMESTER**

**Unit 3 : Concrete**

**Topic 1 : Concrete**



# Concrete

- Concrete is a construction material composed of cement, fine aggregates (sand) and coarse aggregates mixed with water which hardens with time.
- Portland cement is the commonly used type of cement for production of concrete.
- Concrete technology deals with study of properties of concrete and its practical applications.
- In a building construction, concrete is used for the construction of foundations, columns, beams, slabs and other load bearing elements.



# Concrete

- Materials are mixed in specific proportions to obtain the required strength.
- Strength of mix is specified as M5, M10, M15, M20, M25, M30 etc, where M signifies Mix and 5, 10, 15 etc. as their strength in  $\text{kN/m}^2$ .
- Water cement ratio plays an important role which influences various properties such as workability, strength and durability.
- Adequate water cement ratio is required for production of workable concrete.



# Concrete

- When water is mixed with materials, cement reacts with water and hydration reaction starts.
- This reaction helps ingredients to form a hard matrix that binds the materials together into a durable stone-like material.
- Concrete can be casted in any shape.
- Since it is a plastic material in fresh state, various shapes and sizes of forms or formworks are used to provide different shapes such as rectangular, circular etc.
- Various structural members such as beams, slabs, footings, columns, lintels etc. are constructed with concrete.



# Concrete

- There are different **types of admixtures** which are used to provide certain properties.
- Admixtures or additives such as pozzolans or superplasticizers are included in the mixture to improve the physical properties of the wet mix or the finished material.
- Various **types of concrete** are manufactured these days for construction of buildings and structures.
- These have special properties and features which improve quality of construction as per requirement.



# Components of Concrete

- Components of concrete are cement, sand, aggregates and water.
- Mixture of Portland cement and water is called as paste.
- So, concrete can be called as a mixture of paste, sand and aggregates. Sometimes rocks are used instead of aggregates.
- The cement paste coats the surface of the fine and coarse aggregates when mixed thoroughly and binds them.
- Soon after mixing the components, hydration reaction starts which provides strength and a rock solid concrete is obtained.



# Ingredients of Concrete



**Cement**



**Sand**



**Aggregate**



**Fly Ash**



**Admixtures**



**Water**

## Concrete Materials



# Ingredients of Concrete

## 1. Cement

**Cement** is the main binder material used to bind other building concrete materials together. It is used for making mortar and concrete during the construction process.

## 2. Coarse Aggregate

**Coarse Aggregate** forms the major body of concrete. The aggregates contribute to the overall strength of the concrete by increasing density.

## 3. Fine Aggregate (Sand)

Fine aggregate such as sand used to fill in the spaces left between the large coarse aggregate and to “lock” the larger pieces together. Sand helps in reducing the quantity of cement paste required and decreases the amount of shrinkage that could occur.





# Ingredients of Concrete

## 4. Admixture

Admixtures are added to enhance or to modify the properties of fresh & hardened concrete. (Plasticizers, retarders)

## 5. Water

It is the key ingredient, which when mixed with cement, forms a paste that binds the aggregate together. The water contributes to the hardening of concrete through a process called hydration. Its role is major in concrete because the strength of concrete extensively depends on water to cement ratio and it is the critical factor in the production of “perfect” concrete.

## 6. Fly Ash

Fly ash use in concrete improves the workability of plastic concrete and the strength and durability of hardened concrete. Fly ash use is also cost-effective. Fly ash added to concrete to reduce the amount of cement required for concrete, which contributes to considerable saving of cement and cost of concrete making.



***Thank You!!***