



# **SNS COLLEGE OF TECHNOLOGY**

**Coimbatore-35**

**An Autonomous Institution**



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## **DEPARTMENT OF CIVIL ENGINEERING**

### **16CEE304 – CONCRETE TECHNOLOGY**

**III YEAR VI SEM**

#### **UNIT 2 – MIX DESIGN**

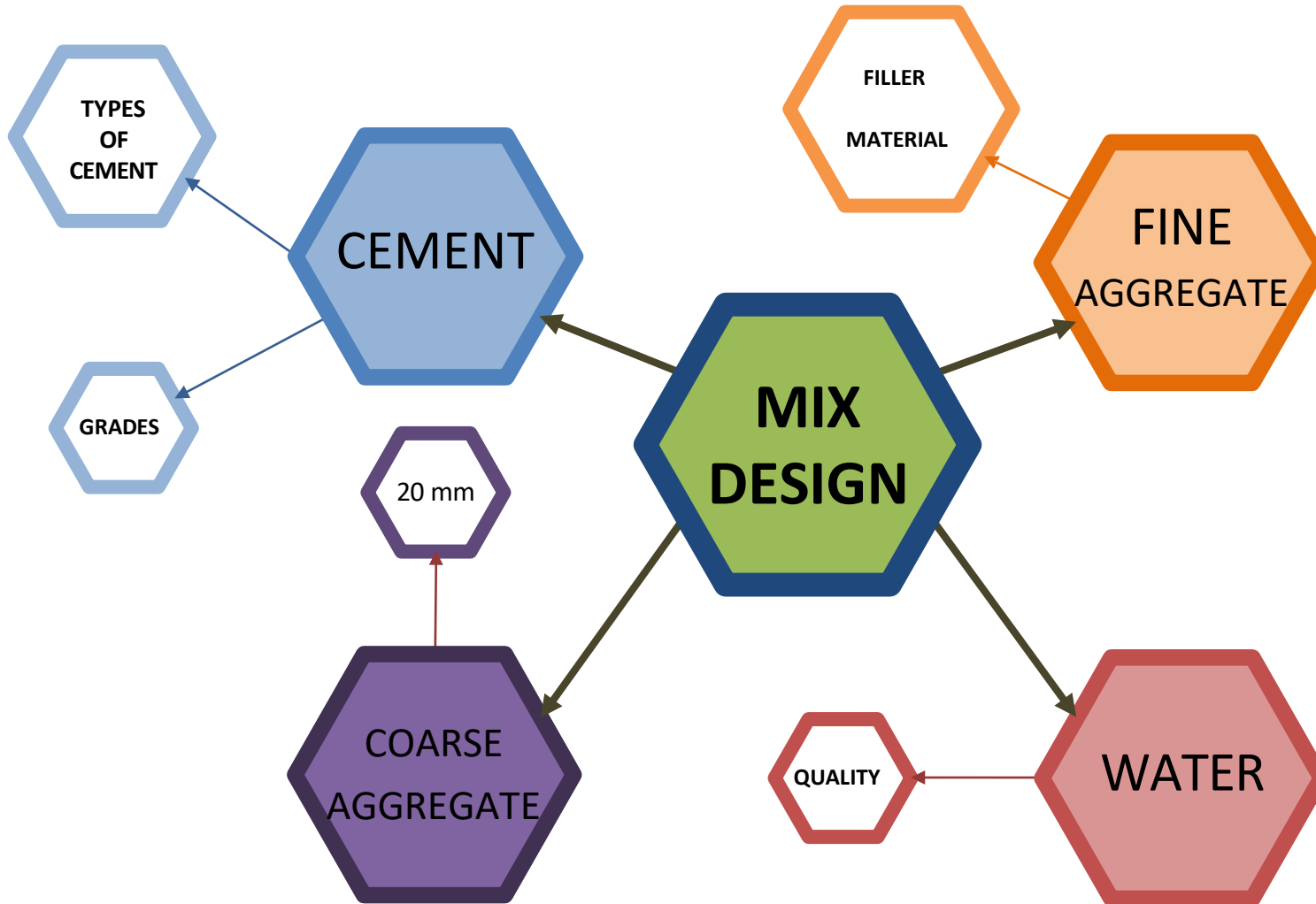
#### **TOPIC 1 – INTRODUCTION TO MIX DESIGN**

# Contents

1. Mix design : Introduction, concept of mix design
2. Various mix design methods
3. Batching of ingredients: volume batching, weigh batching
4. IS method and ACI method of mix proportioning
5. Mix Proportioning of concrete uses admixtures.

# **MIX DESIGN**

# Mind Map – Mix Design



# Concrete

Mixture of Cement, Fine Aggregate, Coarse  
Aggregate and Water.



# Grade of Concrete

| Group                  | Grade designation | Characteristics compressive strength of 150 mm cube at 28 days, N/mm <sup>2</sup> |
|------------------------|-------------------|---|
| Ordinary Concrete      | M10               | 10  |
|                        | M15               | 15  |
|                        | M20               | 20  |
| Standard Concrete      | M25               | 25  |
|                        | M30               | 30  |
|                        | M35               | 35  |
|                        | M40               | 40  |
|                        | M45               | 45  |
|                        | M50               | 50  |
| High Strength Concrete | M55               | 55  |
|                        | M60               | 60  |
|                        | M65               | 65  |
|                        | M70               | 70  |
|                        | M75               | 75  |
|                        | M80               | 80  |

# Mix Design

The process of selecting suitable ingredients of concrete and determining their relative amounts with the objective of producing a concrete of the required, strength, durability, and workability as economically as possible, is termed the concrete mix design.

# What is M 20 ?

- M refers to Mix
- 20 refers to characteristic compressive strength of 150 mm cube at 28 days in  $\text{N/mm}^2$
- The minimum Grade of Plain Concrete (PCC) shall be 15  $\text{N/mm}^2$
- The minimum grade of reinforced Concrete (RCC) shall be 20  $\text{N/mm}^2$



# Characteristic Strength

- Defined as the value below which not more than 5 percent of results are expected to fall.

# Concrete Mix Design

- Art of selecting suitable ingredients of concrete and determining their relative proportions with the object of producing concrete of certain minimum strength & durability as economically as Possible.

## Objectives :



- To achieve the designed/ desired workability in the plastic stage.
- To achieve the desired minimum strength in the hardened stage.
- To achieve the desired durability in the given environmental conditions
- To produce concrete as economically as possible

# Concept of Mix design

- 1. Desired Properties and Requirements:** Every construction project has unique requirements for the concrete used. These requirements may include compressive strength, durability, workability, setting time, and more. Mix design allows engineers to tailor the concrete mixture to meet these specific needs.
- 2. Material Selection:** Mix design involves selecting suitable materials, such as the type and quality of cement, the size and grading of aggregates, and the choice of water-cement ratio. Proper material selection is essential for achieving the desired properties and performance.
- 3. Proportions:** The mix design process determines the exact proportions of each ingredient, which is typically expressed in terms of weight or volume. These proportions are crucial for achieving the desired concrete properties.

# Concept of Mix design

**4. Strength and Durability:** One of the primary goals of mix design is to ensure the concrete reaches the required compressive strength for the intended application. The mix also considers factors like resistance to cracking, freeze-thaw cycles, and chemical attacks to enhance durability.

**5. Workability:** Workability refers to the ease with which concrete can be mixed, placed, and compacted. Mix design can adjust the proportions to achieve the right level of workability for the construction methods being used.

**6. Cost Optimization:** Mix design can help optimize costs by using the least amount of expensive materials, such as cement, while still meeting the project's performance requirements.

# Concept of Mix design

**7. Quality Control:** A well-designed concrete mix facilitates quality control during construction. By having a precise mix, engineers and construction teams can maintain consistency and predictability in the quality of the concrete.

**8. Environmental Considerations:** Mix design can also take environmental factors into account, such as reducing the carbon footprint by using supplementary cementitious materials (SCMs) or recycled aggregates.

**9. Admixtures:** Mix design may include the use of chemical admixtures like plasticizers, accelerators, retarders, and air-entraining agents to further tailor the concrete's properties and performance.

*Thank  
You*