



# **SNS COLLEGE OF TECHNOLOGY**



**AN AUTONOMOUS INSTITUTION**

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**COIMBATORE**

## **DEPARTMENT OF CIVIL ENGINEERING**

**19CET302-DESIGN OF RC STRUCTURAL ELEMENTS**

**III YEAR / V SEMESTER**

**Unit 1 : Introduction**  
**Advantages of Reinforced Concrete**



## Introduction

Reinforced concrete, as a composite material, has occupied a special place in the modern construction of different types of structures due to its several advantages

## Concrete

- Concrete is a product obtained artificially by hardening of the **mixture of cement, sand, gravel and water in predetermined proportions.**
- Depending on the **quality and proportions** of the ingredients used in the mix the **properties of concrete** vary almost as widely as different kinds of stones.
- Concrete has **enough strength in compression, but has little strength in tension.**
- Due to this, concrete is **weak in bending, shear and torsion.** Hence the use of plain concrete is **limited applications** where great compressive strength and weight are the principal requirements and where tensile stresses are either totally absent or are extremely low.



# Advantages of Reinforced Concrete

## 1. Strength

Reinforced concrete has very good strength in tension as well as compression. This makes concrete a desired construction material.

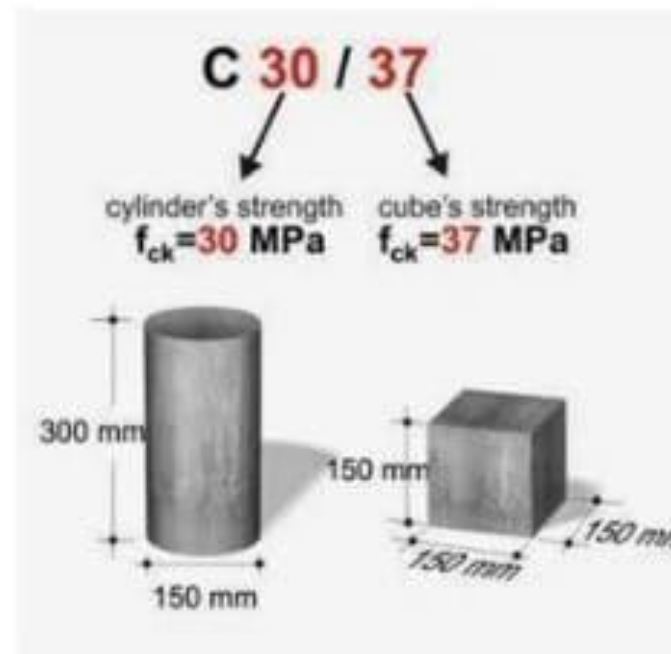
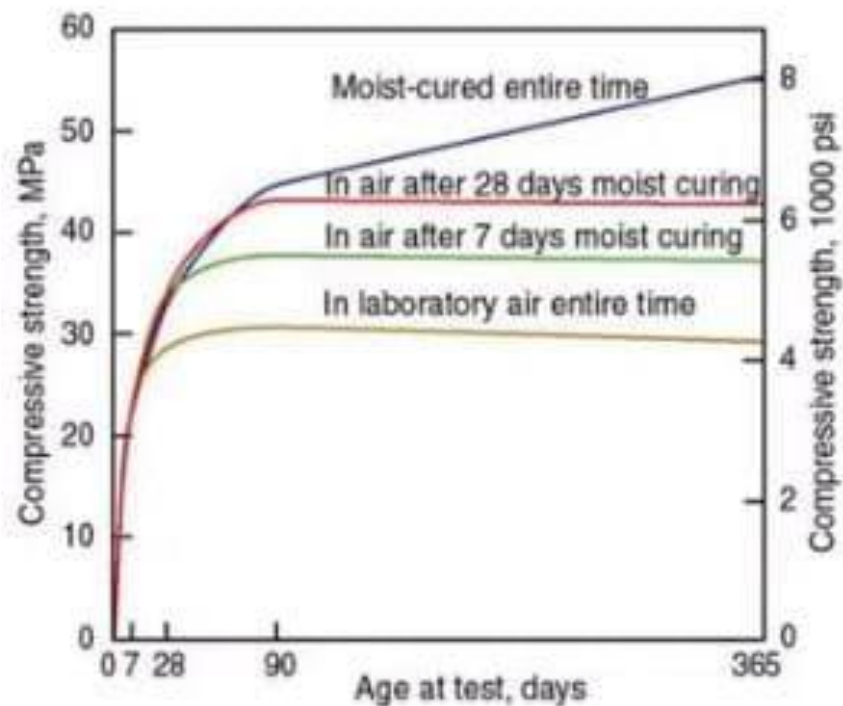


Fig. 1: Strength of Concrete



## 2. Economical

Concrete constituents are widely available worldwide and inexpensive. Similarly, the production cost of concrete is very low. There is an overall economy by using reinforced concrete because its maintenance cost is low due to the long-lasting nature of reinforced concrete.

Reinforced concrete durability, resilience, low maintenance requirements and energy efficiency, concrete structures reduce operating costs related to operational energy consumption, maintenance, and rebuilding following disasters.



### 3. Versatility

Concrete can be placed into various shapes of shuttering or formwork configurations to form desired shapes, form, surface, texture, and sizes at construction site. This is because fresh concrete is flowable and is in liquid state. Therefore, it is more suitable for architectural requirements.





## 4. Durability

Reinforced Concrete structures are durable if designed and laid properly. The material is not affected by weather such as rainfall and snow, and they can last up to 100 years.

Due to low permeability, concrete can resist chemicals dissolved in water such as sulfates, chloride and carbon dioxide, which may cause corrosion in concrete, without serious deterioration.

That is why reinforced concrete is ideal to underwater and submerged applications like for building structures, pipelines, dams, canals, linings and waterfront structures.



High Durable Concrete in Aggressive Environment



## 5. Fire Resistance

The nature of concrete does not allow it to catch fire or burn. It can withstand heat for 2–6 hours enabling sufficient time for rescue operations in case of fire. Reinforced concrete buildings are more fire resistant than other commonly used construction materials like steel and wood. It is suitable to fireproof steel and used in high temperature and blast applications.

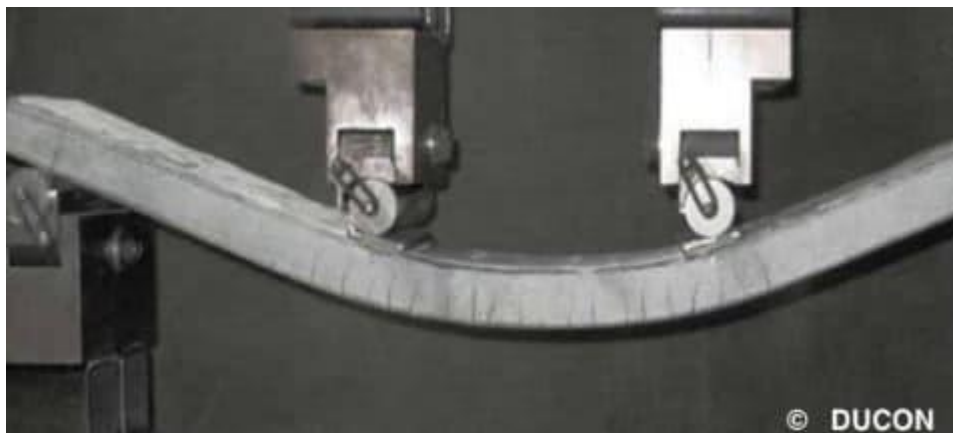


Fire Resistance of Concrete



## 6. Ductility

The steel reinforcement imparts ductility to the reinforced concrete structures. Ductility enables concrete to show sign of distress such as cracking and deflection if reinforced concrete member experience overloading. This enables engineers to consider suitable measures to prevent further concrete damages.



Concrete Ductility





## **7. Seismic Resistance**

Properly designed reinforced concrete structures are extremely resistant to earthquakes.

## **8. Ease of Construction**

Compared to the use of steel in structure, reinforced concrete requires less skilled labor for the erection of the structure.

## **9. Ability to Consume and Recycle Waste**

Several industrial wastes and by-products such as fly ash, slag also known as GGBFS or ground granulated blast-furnaces slag, waste glass, and even ground vehicle tires can be recycled as a substitute for cement or aggregate or supplementary materials



1. What does R.C.C. stand for?
  - a) Reinforced Cement Concrete
  - b) Reinforced Concrete Cement
  - c) Reinforced Combined Cement
  - d) Reinforced Constituent Cement
  
2. The maximum area of tension reinforcement in beams shall not exceed \_\_\_\_\_
  - a) 2%
  - b) 4%
  - c) 0.15%
  - d) 1.5%
  
3. For initial estimate for a beam design, the width is assumed \_\_\_\_\_
  - a) 1/15th of span
  - b) 1/10th of span
  - c) 1/20th of span
  - d) 1/30th of span
  
4. A foundation rests on \_\_\_\_\_
  - a) base of the foundation
  - b) subgrade
  - c) foundation soil
  - d) base of the foundation, subgrade and foundation soil
  
5. Partial safety factor on concrete stresses is
  - A. 1.25
  - B. 1.35
  - C. 1.45
  - D. 1.50



# THANK YOU