Plain Cement Concrete

The major ingredients of concrete are,

1. Binding material (like cement, lime or polymer)

2. Fine Aggregate (sand)

3. Coarse aggregate (crushed stones, jelly)

4. Water

Uses of plain cement concrete is listed below:

1. As bed concrete below the wall footings, column footings and on walls below beams.

2. As sill concrete to get a hard and even surface at window and ventilator sills.

3. As coping concrete over the parapet and compound walls.

4. For flagging the area around the buildings.

5. For making pavements.

6. For making tennis courts, basket ball courts etc.

Reinforced Cement Concrete (RCC)

Concrete is good in resisting compressive stress but is very weak in resisting tensile stress. Hence reinforcement is provided in concrete wherever tensile stress is expected. The best reinforcement is steel. The tensile strength of steel is quite high and bind between concrete and steel is also good.

Properties of RCC

1. It should be capable of resisting tensile, compressive, bending or shear stresses

2. It should not show excessive deflections to spoil the serviceability requirements

3. There should be proper cover to reinforcement so that corrosion is steel is prevented

4. The hair cracks developed should be within permissible limit

5. RCC has good fire resistance

6. It can be moulded desired shape and size

7. Durability of RCC is very high

8. RCC can be designed to resist any type of loads

Uses

1. RCC used as a structural element whenever direct tension or bending tension is expected. Common structural elements in a building where RCC is used are footing, column, beam, lintel, roof slab, staircase etc.

2. RCC is used for construction of storage structures like water tank, dams, bunkers, silos and bins.

3. It is used in construction of massive structures such as bridges, retaining walls docks and harbour, underwater structures

4. RCC is used for construction of tall structures like multi-storeyed buildings chimneys and towers

5. RCC is used for paving highways, city roads, and airport runways.

6. RCC is used in nuclear power plants to prevent leakage of dangerous radiations. For this purpose RCC walls of 1.5 to 2m thick are built

Pre-stressed Concrete (PSC)

Prior to application of service loads if we introduce compression on the side where tension is expected in service condition then the service load hardly introduces any tensile cracks. The process of applying stress before the application of service loads to increase the load carrying capacity is called as pre-stressing.

This pre-stressing is done by two methods. First method is by extending the high tensile steel wires and then pouring concrete this method is called as pre-tensioning. Second method is by making ducts in concrete members through which high tensile steel wires are passed extended and clamped, this method is called as post-tensioning.

Because of pre-stressing members will be able to withstand higher loads without developing tensile cracks.

Uses of PSC

1. PSC is commonly used in railway and road bridge girders

2. It is used in railway sleepers

3. It is used in making electric poles

4. It is used in making bridges

5. It can be used for making roofing elements

6. Circular pre-stressing can be used for storage tanks.

Structural steel

Structural steel is mainly used for construction purposes due to the rigidity and high strength to weight ratio.

Structural steel is used to construct residential and commercial buildings, warehouses, aircraft hangers, hospital and school buildings, metro stations, stadiums, bridges, etc.

Construction of these structures is done with the help of structural steel design components such as channels, beams, angles, and plates.

Steel is the most commonly used structural metal, due to its various properties like great strength, good ductility and high strength, allowing easy fabrication.

Due to its high strength members of light sections can be used to carry a heavy load, which means there is considerable reduction in dead load.

Advantages of Steel to be used as structural material

1.High strength to low weight good for long span bridges, tall buildings.

2. Lightweight compared to concrete - can be handled and transported, and prefabricated.

3. Properly maintained have a long life.

4. Uniformity properties do not change with time.

5. A ductile material, does not fail suddenly, but gives visible evidence of failure by large deflections.

6. Additions and alterations can be made easily.

7. They can be erected at a faster rate compared to reinforced concrete.

8. Steel has the highest scrap value.

9. Can be even reuse on demolition.

Disadvantages of Steel to be used as structural material

1. When placed in exposed conditions, are subjected to Disadvantages of steel as a structural material corrosion. They require painting, hence induce high maintenance cost.

2. Needs fire proof treatment, which increase cost

3. Fatigue – strength reduced if large number of stress reversals..