TYPES OF CONCRETE USED IN CONSTRUCTION 14.1. Vocabulary

Ex. 1. Match the words to make collocations.

1. tensile	a. voids
2. volume of	b. strength
3. retarding	c. agent
4. initial	d. setting time

Ex. 2. *Complete the sentences with the following words:*

volume, pumice, tendons, constituent, assemblage, density, scoria, perlite

Water is an important _____(1) in making concrete.

The _____(2) of this rock is higher than the density of water.

The _____(3) of these parts requires careful planning.

_____(4) is a lightweight volcanic rock often used for exfoliating the skin.

_____(5) is commonly added to soil mixtures to improve drainage.

_____(6) can be used as a decorative element in landscaping.

The _____(7) of voids in this sponge is very high.

(8) are commonly used in reinforcing concrete structures.

Ex. 3. Choose FIVE words or collocations from ex. 1. and 2, then make sentences with them.

14.2. Reading

Ex. 1. Read the text.

Types of Concrete Used in Construction

1. Normal Strength Concrete

The concrete that is obtained by mixing the basic ingredients cement, water and aggregate will give us normal strength concrete. The strength of these type of concrete will vary from 10 MPa to 40MPa. The normal strength concrete has an initial setting time of 30 to 90 minutes that is dependent on the cement properties and the weather conditions of the construction site.

2. Plain Concrete

The plain concrete will have no reinforcement in it. The main constituents are the cement, aggregates, and water. Most commonly used mix design is 1:2:4 which is the normal mix design. The density of the plain concrete will vary between 2200 and 2500 Kg/meter cube. The compressive strength is 200 to 500 kg/cm2. These types of concrete are mainly used in the construction of the pavements and the buildings, especially in areas where there is less demand of high tensile strength. The durability given by these type of concrete is satisfactory to high extent.

3. Reinforced Concrete

The reinforced cement concrete is defined as the concrete to which reinforcement is introduced to bear the tensile strength. Plain concrete is weak in tension and good in compression. Hence the placement of reinforcement will take up the responsibility of bearing the tensile stresses. R.C.C works with the combined action of the plain concrete and the reinforcement. The steel reinforcement used in the concrete can be in the form of rods, bars or in the form of meshes. Now fibers are also developed as reinforcement. Fiber reinforced concrete are concrete that use fibers (steel fibers) as reinforcement for the concrete. Use of meshes in concrete will give ferrocement. Whatever be the type of reinforcement used in concrete, it is very necessary to ensure proper bond between the concrete and the reinforcement. This bond will control the strength and the durability factors of the concrete.

4. Prestressed Concrete

Most of the mega concrete projects are carried out through prestressed concrete units. This is a special technique in which the bars or the tendons used in the concrete is stressed before the actual service load application. During the mixing and the placing of the concrete, these tensioned bars placed firmly and held from each end of the structural unit. Once the concrete sets and harden, the structural unit will be put in compression. This phenomenon of prestressing will make the lower section of the concrete member to be stronger against the tension.

The process of prestressing will require heavy equipment and labor skill (jacks and equipment for tensioning). Hence the prestressing units are made at site and assembled at site. These are used in the application of bridges, heavy loaded structures, and roof with longer spans.

5. Precast Concrete

Various structural elements can be made and cast in the factory as per the specifications and bought to the site at the time of assembly. Such concrete units are called as the precast concrete. The examples of precast concrete units are concrete blocks, the staircase units, precast walls and poles, concrete lintels and many other elements. These units have the advantage of acquiring speedy construction as only assemblage is necessary. As the manufacturing is done at site, quality is assured. The only precaution taken is for their transportation.

6. Lightweight Concrete

Concrete that have a density lesser than 1920kg/m3 will be categorized as lightweight concrete. The use of lightweight aggregates in concrete design will give us lightweight aggregates. Aggregates are the important element that contributes to the density of the concrete. The examples of light weight aggregates are the pumice, perlites, and scoria. The light weight concrete is applied for the protection of the steel structures and are also used for the construction of the long span bridge decks. These are also used for the construction of the building blocks.

7. High-Density Concrete

The concretes that have densities ranging between 3000 to 4000 kg/m3 can be called as the heavyweight concrete. Here heavy weight aggregates are used. The crushed rocks are used as the coarse aggregates. The most commonly used heavy weight aggregates is Barytes. These types of aggregates are most commonly used in the construction of atomic power plants and for similar projects. The heavy weight aggregate will help the structure to resist all possible type of radiations.

8. Air Entrained Concrete

These are concrete types into which air is intentionally entrained for an amount of 3 to 6% of the concrete. The air entrainment in the concrete is achieved by the addition of foams or gas - foaming agents. Some examples of air entraining agents are resins, alcohols, and fatty acids.

9. Ready Mix Concrete

The concrete that mix and bathed in a central mixing plant is called as ready-mix concrete. The mixed concrete is brought to the site with the help of a truck-mounted transit mixer. This once reached in the site can be used directly without any further treatment. The ready-mix concrete is very precise and specialty concrete can be developed based on the specification with utmost quality. The manufacture of these concrete will require a centralized mixing plant. These plants will be located at an adjustable distance from the construction site. If the transportation is too long then it will result in setting of concrete. Such issues of time delay are cope up with the use retarding agents that delays the setting. Read More: Ready Mix Concrete Batching, Mixing, Transporting, and Handling

10. Polymer Concrete

When compared with the conventional concrete, in polymer concrete the aggregates will be bound with the polymer instead of cement. The production of polymer concrete will help in the reduction of volume of voids in the aggregate. This will hence reduce the amount of polymer that is necessary to bind the aggregates used. Hence the aggregates are graded and mixed accordingly to achieve minimum voids hence maximum density. This type of concrete has different categories:

- Polymer Impregnated Concrete
- Polymer cement concrete
- Partially Impregnated

Ex. 2. Choose the correct answer.

- 1. What are the basic ingredients of normal strength concrete?
- a) Cement, water and aggregate
- b) Cement, water and reinforcement

- c) Cement, aggregate and reinforcement
- d) Cement, water, aggregate and reinforcement
- 2. What is the initial setting time of normal strength concrete?
- a) 30 to 60 minutes
- b) 30 to 90 minutes
- c) 60 to 90 minutes
- d) 60 to 120 minutes
- 3. What is the compressive strength of plain concrete?
- a) 200 to 500 kg/cm2
- b) 500 to 1000 kg/cm2
- c) 1000 to 1500 kg/cm2
- d) 1500 to 2000 kg/cm2
- 4. Where are plain concrete mainly used?
- a) In the construction of bridges
- b) In the construction of buildings with high tensile strength demand

c) In the construction of pavements and buildings with less demand of high tensile strength

- d) In the construction of heavy loaded structures
- 5. What is reinforced cement concrete?
- a) Concrete with reinforcement to bear the compressive strength
- b) Concrete with reinforcement to bear the tensile strength

c) Concrete with reinforcement to bear both compressive and tensile strength

- d) Concrete with no reinforcement
- 6. What is the purpose of reinforcement in reinforced concrete?

- a) To bear the compressive strength
- b) To bear the tensile strength
- c) To bear both compressive and tensile strength
- d) To make the concrete denser
- 7. What can be used as reinforcement in concrete?
- a) Only rods and bars
- b) Only meshes
- c) Only fibers
- d) Rods, bars, meshes and fibers
- 8. What is the process of prestressing in prestressed concrete?

a) The bars or tendons used in the concrete is stressed after the actual service load application

b) The bars or tendons used in the concrete is stressed before the actual service load application

- c) The concrete is stressed after the actual service load application
- d) The concrete is stressed before the actual service load application
- 9. What are the advantages of precast concrete units?
- a) Speedy construction and quality assurance
- b) Lower cost and durability
- c) Higher tensile strength and compressive strength
- d) Easier transportation and installation
- 10. What are some examples of precast concrete units?

a) Concrete blocks, staircase units, precast walls and poles, concrete lintels

b) Steel beams, wooden planks, glass panels, plastic sheets

c) Bricks, mortar, cement bags, sand

d) Nails, screws, bolts, nuts

Ex. 3. Answer the questions

1. What is lightweight concrete and what are some examples of lightweight aggregates?

2. In which applications is lightweight concrete commonly used?

3. What is high-density concrete and what type of aggregates are used in its production?

4. Where are heavy weight aggregates most commonly used?

5. What is air entrained concrete and how is it achieved?

6. What is ready-mix concrete and how is it transported to the construction site?

7. How does polymer concrete differ from conventional concrete, and what are some categories of polymer concrete?