

Paper Concrete Technology

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Q No 1 Causes of Concrete Deterioration:-

Ans- The exceptional durability of Portland Cement concrete is a major reason why it is the world's most widely used construction material. But material limitations, design and construction practices, and severe exposure conditions can cause concrete to deteriorate which may result in aesthetic, functional, or structural problems. Concrete can deteriorate for a variety of reasons, and concrete damage is often the result of a combination of factors. The following summary discusses potential causes of concrete deterioration and the factors that influence them.

When water freezes, it expands about 9%. As the water in moist concrete freezes, it produces pressure in the capillaries and pores of the concrete.

① Frost Action:⇒

Frost action can be quite detrimental to pavements and refers to two separate but related processes:

① Frost heave. An upward movement of the subgrade resulting from the expansion of accumulated soil moisture as it freezes.

② Thaw weakening. A weakened subgrade condition resulting from soil saturation as ice within the soil melts. Frost heaving of soil is caused by crystallization of ice within the larger soil voids and usually a subsequent

extension to form continuous ice lenses, layers, or other ice masses.

② Effect of fire :->

The behaviour of concrete in fire depends on its mix proportions and constituents and is determined by complex physicochemical transformations during heating. Normal strength concretes and high-performance concretes microstructurally follow similar trends when heating but ultra-high-per-
-formance concrete behaves differently. A key property unique to concrete.

③ Sulphate attack :->

Sulfate attack in cement mortar and concrete. Cement is composed of mainly two minerals tricalcium silicates

and dicalcium silicates. upon hydration, the main reaction products are a calcium silicate gels and calcium hydroxide Ca(OH)_2 or CH in cement chemistry

External: \Rightarrow due to penetration of sulfates in solution, in groundwater for example into the concrete from outside.

Internal: \Rightarrow due to a soluble source being incorporated into the concrete at the time of mixing, gypsum ~~is~~ ~~in~~ ~~the~~ ~~aggregate~~ ~~or~~ ~~in~~ the aggregate, for example.

④ Alkali-Aggregate Reaction

① Random map cracking and closed joints and attendant spalling concrete are indicators of alkali-silica reactions.

② Petrographic examination can identify alkali-silica reactions.

③ it occurs broadly because aggregates containing reactive silica materials are more common.

④ Alkali-silica reaction generates enough expansive pressure to damage concrete.

⑤ Alkali-silica reaction generates enough expansive pressure to damage concrete.

Q3A

① **Batching** \Rightarrow Batching is the process of measuring concrete mix ingredients either by volume or by mass and introducing them into the mixture. Traditionally batching is done by volume ~~by~~ but most specifications require that batching be done by mass rather than volume. Percentage of accuracy for measurement of concrete materials as follows.

② **Mixing** \Rightarrow The mixing operation consists of rotation or stirring, the objective being to coat the surface of all aggregate particles with cement paste and to blend all the ingredients of the concrete into a uniform mass; this uniformity must not be disturbed.

by the process of discharging from the mixer.

Q.No 28

- (4) Kelly ball test: The kelly apparatus is as shown in it consists of a metal ball which is in hemispherical shape and weighs about 13.6 kilograms (30 pounds). The diameter of the metal ball is about 15 cm (6 inches). The flat end of the metal ball is attached to a graduated stem with handle. A frame is arranged between the ball and stem in such a way that the stem can slide through it when the ball moves vertically. The frame generally ~~rests~~ rests on the concrete surface during testing.

Q2B

1 Slump test: \Rightarrow The strength of a given mix proportion is seriously affected by the degree of its compaction. It is therefore important that the consistency of a given mix proportion is seriously such that the concrete can be transported placed and finished sufficiently easily and without segregation. A concrete satisfying these conditions is said to be workable. Workability is a physical property of the concrete depending on the external and internal friction of the concrete matrix, internal friction being provided by the surface on which the concrete comes into contact with.

Consistency of concrete is another way of expressing workability but it is more confined to the parameters of water content.

No Q18
What are the effects of cement characteristics on strength and heat of hydration explain briefly.

Ans: The exothermy of cement hydration causes a temperature increase and development of temperature gradients in large concrete structures. These temperature gradients create mechanical stresses which can induce the development of cracks. These cracks facilitate the penetration of corrosive elements from the outside such as chlorides, sulfates and salts. A temperature higher than 65°C can also induce the development of delayed ettringite formation (DEF) understanding which parameters in cement influence the most the release of heat is interesting in this study. Screenings of constituents and characteristics of cement are performed so to determine which ones have the most.

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influence on the thermal activity and heat released in massive concrete structure (3A) seems to be the most influence parameters at early age ::

Q3 (Compacting)

"To determine the consistency of fresh concrete to determine the difference between the fully compacted concrete and the partially compacted concrete this is a site test to determine the consistency or workability of concrete and is conducted in the lab compaction factor test is classified into two sections viz ::

Materials used ::

- 1 Coarse aggregate (Gravel)
- 2 Fine aggregate (Sand)
- 3 Binder (Cement)
- 4 water:

Q 3B Segregation of concrete.

is the separation of cement paste and aggregates of concrete from each other during handling and placement. Segregation also occurs due to over vibration or compaction of concrete in which cement paste comes to the top and aggregates settle at the bottom.

Segregation of concrete affects strength and durability in structures. In a good concrete all concrete aggregates are evenly coated with sand and cement paste and form a homogeneous mass.

during handling, transporting and placing due to jerks and vibration the paste of cement and sand gets separated from coarse aggregate. It should be remixed properly before depositing. However, a concrete where initial setting time is over should not be used.

1 Use of higher water cement ratio in concrete. This generally happens in case of concrete mixed at site by unskilled workers.

2 Excessive vibration of concrete with mechanical needle vibration makes heavier particles settle at bottom and lighter cement sand paste comes on top.

3 When concreting is done from high in case of underground foundations and refts which causes concrete to segregate.

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advantages of Super plasticizer

admixture

disadvantage

application of Super plasticizer.

admixtures:

will not retain its shape when the cone is removed

5 **V** Vee Bee Test:⇒

The main objective of Vee Bee test is to determine the workability of the ~~the~~ freshly mixed concrete. The Vee Bee test gives an indication about the mobility and the compactibility aspect of the freshly mixed concrete.

To modify the properties of hardened concrete mortar and grout to:

when concrete admixtures used:

How to used concrete admixtures.

Types of concrete admixture additives

1 air Entraining admixtures

mechanism of air entraining concrete admixtures

properties of air entraining concrete admixtures:

2 Accelerating admixtures

uses of Accelerating concrete admixtures

Disadvantages of accelerating concrete admixtures

3 water reducing admixtures

chemical types for water reducing admixtures

mode of action

why water reducing admixtures are

use effect on durability

effect on shrinkage

Effect on Creep
detrimental affect
application of water Reducing Concrete
admixture

4 Retarding Concrete admixtures
Chemical type for retarding Concrete
admixtures

mode of action

why Retarding Concrete admixture
are used?

advantage of retarding Concrete
admixture

detrimental effect

applications of retarding Concrete
admixture.

15/11 Super plasticizers or High range
water.

Reducing admixtures in Concrete

The commonly used Superplasticizer
are follows.

Chemical type

mod of action of Super plasticizer
admixture

why Super plasticizer admixtures
are used.