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Section : B

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Paper : Concrete Technology

Q3

Answer:-

Rapid Hardening Cement attains high strength in early days it is use in concrete where formworks are removed at an early stage an is similar to ordinary portland Cement and contains higher C3s Content and finer grinding which gives greater strength development than OPC at an early stage The strength of rapid hardening Cement at the 3 days is similar to 7 days strength of OPC with the same water-cement ratio. thus, advantage of this cement is that formwork can be removed earlier which increases the rate of construction and decrease cost of construction by saving formwork cost. Rapid hardening Cement is used in prefabricated

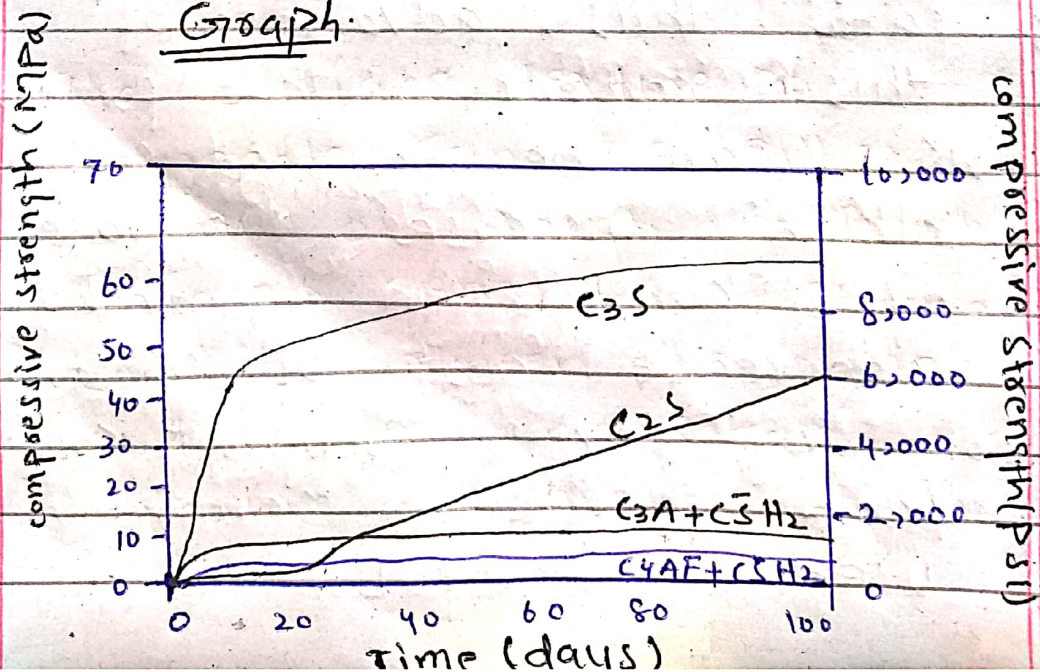
concrete construction, road works, etc.

Quick Setting Cement:

The Difference between the quick setting cement and rapid hardening cement is that quick setting cement sets earlier while rate of gain of strength is similar to ordinary portland cement gains strength quickly. formwork in both cases can be removed earlier.

Quick setting cement is used where works is to be completed in very short period and for concreting in static or running water.

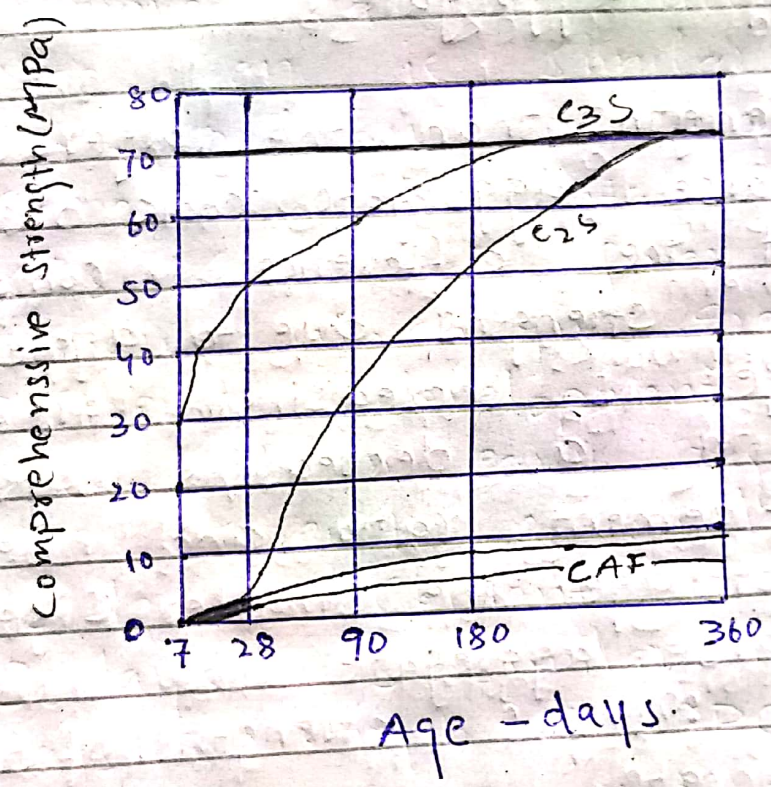
Graph:



Qa

Answer

Graph showing the strength development of pure compounds of cement



Qb

Answer:-

(i) Particulate shape principally affects the w/c ratio by its effects on water demand and amount of paste required for

workability of given mixture. Also, the bond with the cement paste may be weakened due to the accumulation of bleed water under the relatively larger surface areas of flat particles of aggregate.

(2) Strengths than the larger sized coarse aggregate, Cook observed that the difference in compressive strengths due to aggregate size is increasingly larger with a decreasing water-to-cement ratio and increasing test age. The smaller sized coarse aggregate also increase the flexural strength of the concrete.

(3) The surface texture of aggregate can be either smooth or rough. A smooth surface generates a stronger bond between the paste and the aggregate creating a higher strength.

page
5.

(4) Bleeding in concrete may be considered as the physical migration of water towards the top surface as it increases. finishing time, produces laitance at the surface, decreases strength, wear resistance and bonds between & strength and causes poor bonds between successive lifts.

Q8

Answer:

(1) The higher the specific surface is the finer cement will be, the rate of hydration depends on the fineness of cement, particles, more the fineness of the cement is, more rapid is the development of strength of concrete.

(2) The fineness of cement affects hydration rate, and in turn, the strength, increasing fineness causes

an increased rate of hydration, high strength, and high heat generation. However, increased fineness can also lead to the requirement of more water for workability, resulting in a higher possibility of dry shrinkage.

(3) The size of cement particles directly affects the hydration, setting and hardening, strength and heat of hydration. The finer the cement particles are, the larger the total surface area is and the bigger the area contacting with water.

(4) When fineness of cement increases beyond a certain particles size, the particles of cement in the concrete. Therefore, the particles flow and less effort/work is required for compaction of concrete. i.e. the water demand decreases to obtain the same degree of workability.

Q9

Answer:-

Segregation in concrete is commonly thought as separation of some size groups of aggregates from cement mortar in isolated locations with corresponding deficiencies of these materials in other locations. Segregation results in proportions of the hard concrete being in variation to those as designed.

steps:-

(1) the concrete mix should be properly designed with optimum quantity of water to make a cohesive mix. Such concrete will not exhibit any tendency for segregation.

(2) Field quality control must be maintained while handling, transporting, placing and compacting and finishing concrete.

- (3) If at any stage Segregation is observed then remixing should be done to make the concrete again homogeneous.
- (4) Admixture, such as pozzolanic materials or air entraining agent should be used to avoid Segregation. Air entrainment permits a reduction of the mixing water with ~~no~~ no loss of slump which increase workability and decrease Segregation and bleeding.
- (5) Concrete should ~~be~~ not be allowed to fall from heights. It should be placed as near its final position as possible.

Q1

Answer:-

When cement is mixed with water it becomes hard over a period of time. This is called setting of cement. Gypsum is often added to Portland cement to prevent early hardening or "flash setting" allowing a longer working time. Gypsum slows down the setting of cement so that cement is adequately hardened.

Setting of cement:-

When cement reacts with water, the silicates and aluminates of calcium gets converted to the hydrated colloidal gels.

False set is the rapid development of rigidity in freshly mixed mortar or concrete without the evolution of much heat.

Plasticity can be regained by further mixing.

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Flash set is also the rapid development of rigidity, but with the evolution of considerable heat. Contractors occasionally, meaning speak of getting a "hot load" of concrete, meaning the concrete stiffens quickly and is difficult to place & consolidate, and finish. Through hot loads can be caused by high concrete and air temperature. Certain cement or admixture properties can also lead to early stiffening.

Q5 :-

Answer :-

Gypsum is called the retarding agent of cement which is mainly use for regulating the setting time of cement and is an indispensable component. Without gypsum, cement clinker can condense

immediately by mixing with water and release heat. The major reason is that C_3A in the clinker can dissolve in water quickly to generate, which will destroy a kind of calcium aluminate hydrate, a clotting agent, which will destroy the normal use of cement. \rightarrow hydrate, use

The retardation mechanism of gypsum is: when cement is hydrated, gypsum reacts with C_3A quickly to generate calcium sulfoaluminate hydrate which deposits and forms a protection film on the cement particles to hinder the hydration of C_3A and delay the setting time of cement.

In the content of gypsum is too little, the retardation effect will be unobvious. Too much gypsum will accelerate

The setting of cement because gypsum can generate a clotting agent itself. The appropriate amount of gypsum depends on the cement of CFA in the cement and that of SO_3 in gypsum, and it also related to the fineness of cement and the content of SO_3 in clinker. The amount of gypsum should amount for 3% - 5% of the cement mass if the cement mass contents of gypsum exceeds the limit, it will lower the strength of cement and it can even lead to poor dimensional stability, which will cause the expanded destruction of cement paste. Thus, the national standard requires that the contents of SO_3 should not be more than 3.5%.

Q7 Answer :-

(1) The porosity of an aggregate may also affect workability of concrete. If the aggregate can absorb a great deal of water, less will be available to provide workability.

(2) The benefits of entraining air in the concrete include increased resistance to freeze-thaw degradation, increased cohesion resulting in bleed and segregation in low-workability mixes. The volume of air entrained depends on the application and the mix design.

(3) The particles size of coarse aggregate influences the water requirement for a given consistency. Additionally, very fine or angular sands require

more water for a given consistency, which produce harsh and unworkable mixture at a water content that might have been adequate with a coarse or a well-rounded sand.

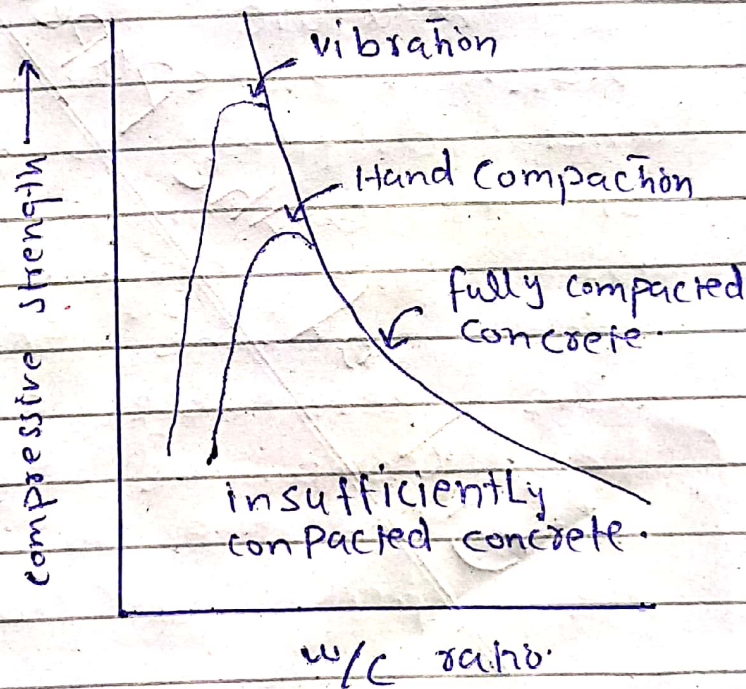
- (1) when finer aggregate deficiency results in a mixture that is harsh, prone to segregation and difficult to finish, on the contrary, an excess of fine aggregate will lead to some extent more permeable and less economical concrete. although the mixture will be easily workable.

Qy ::

Answer:

Compaction is the process which expels entrapped air from freshly placed

Concrete ... and packs the aggregate particles together so as to increase the density of concrete. It increases significantly the ultimate strength of concrete and enhances the bond with reinforcement.



The compressive strength of hardened concrete is one of the most important and useful properties of concrete. It is used mainly to

resist the compressive stresses in situations where the shear or tension strength is of importance, the compressive strength is usually used as a measure of these properties.

End of the Paper