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Subject : Concrete Technology

Department : Civil Engineering

Section : A

Mid term Assignment

"Concrete Technology"

1:- Which step is taken to prevent flash setting of cement? Also, write steps to prevent false setting of concrete?

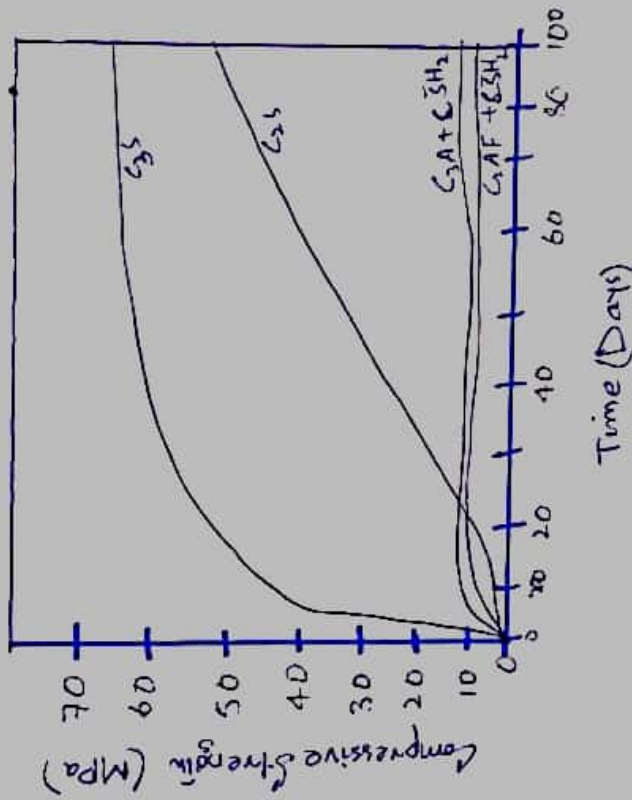
Ans 01 :- (a) Gypsum is often added to Portland cement to prevent early hardening or flash setting allowing a longer working time. Gypsum slows down the setting of cement so that cement is adequately hardened.

(b) STEPS :- (i) HYDROLYSIS AND HYDRATION
STAGE :- In this process the four main compounds of cement get hydrated. " C_3S " compound of cement get hydrated and form a complex hydro silicates.

(ii) COLLOIDISATION STAGE :- The products formed from the above stage separate out in the form of a gel which gets gradually thicken and acts as glue around aggregates.

(iii) CRYSTALLISATION STAGE :- Most of the components of colloidal state forms into crystalline state. The development of crystals and hardening of gel results into a strong mass of crystals and gels.

Q#02:- Graph Showing the strength development of pure compounds of cement. ②

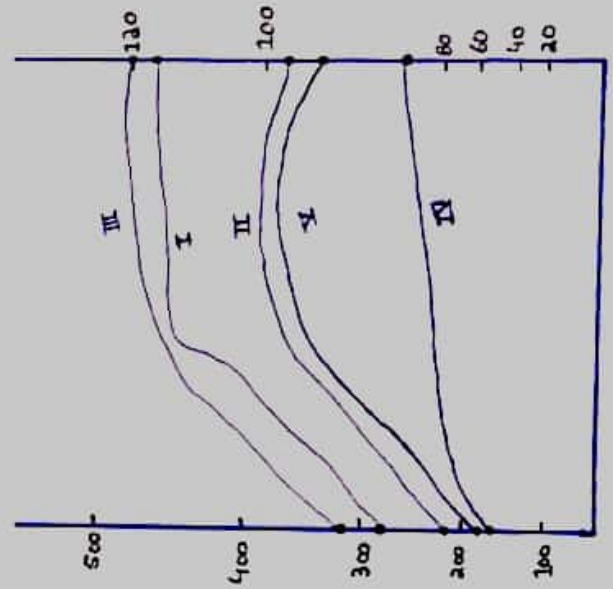


Answer NO :- 03

③
TYPE III cement is Rapid Hardening :- The rate of strength gain occur due to increase of C_3S compound and due to finer grinding of the cement & klinker

TYPE IV Low Heat Producing :- It contains less C_3S and C_3A percentage and higher percentage of C_2S in comparison with ordinary Portland cement.

Development of heat of hydration of different Cement types .

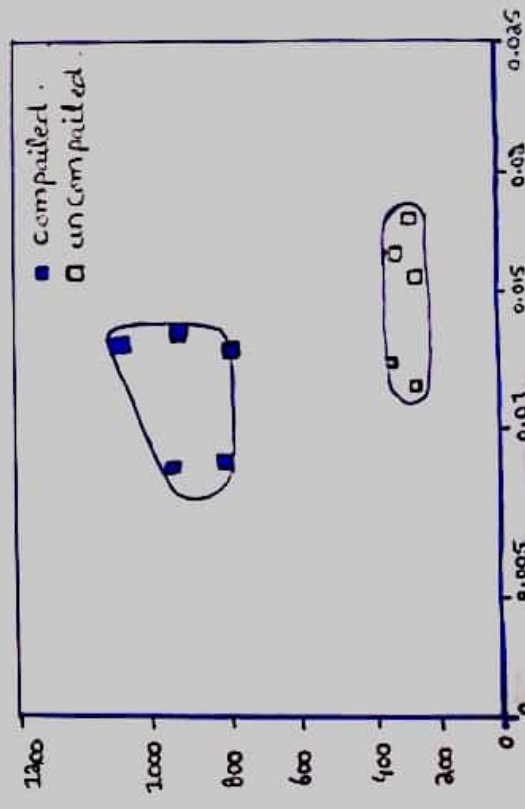


Q

Answer NO 1- 04

Part (a) :- The strength of concrete is nearly 30% lowered when concrete has 5% voids. Thus the aim of compaction is to eliminate entrapped air from the concrete and it is possible by vibrating concrete. Thus the entrapped air gives strength and density to the compaction.

Part (b) :- Compaction of concrete influences the strength, durability, impermeability of concrete to a great extent. Each one percent less compaction reducing the strength of concrete by about five percent on an average. Thus the strength of concrete is decrease if concrete is not compacted sufficiently.



Answers No : 05

⑤

If you add extra amount of Gypsum in the cement it will affect the setting time and if there is less amount in cement it will make D-crack by forming an ettringite that's why only five percent of Gypsum is added to the cement.



1) **SHAPE OF AGGREGATE :-** Concrete is more workable when smooth and rounded aggregate is used instead of rough angular or elongated aggregate.

a) **SIZE OF AGGREGATE :-** When the particles are of uniform sizes the spacing is the greatest, but when aggregate of sizes is used the void spaces are filled and the paste requirement is lowered. The more these voids are filled, the less workable the concrete becomes.

3) **TEXTURE OF AGGREGATE :-** The surface texture of aggregate can be either smooth or rough. A smooth surface can improve workability and a rough surface generates a stronger bond between the paste and aggregate creating a higher strength.

4) **Bleeding :-** Bleeding in concrete is the physical migration of water towards the top surface. Bleeding is not always favourable as it decreases the strength of bond and causes poor bonds b/w successive lifts.

1) Porosity and Absorption :- When the porosity and absorption of water is increase then the strength of concrete is decrease thus the workability is increased.

2) AIR ENTRAINING AGENT :- Due to air entrapped in the paste the water does not settle well and this results in decreasing the strength. So the workability will be increased.

3) Coarse aggregate to fine aggregate ratio :-

When a specific ratio of coarse aggregate to fine aggregate ratio is taken then there will be no effect on workability. But when the ratio is decrease or increase it will affect the workability.

4) Grading of aggregate :- After sieves analysis,

a well grade is obtained so the workability will be good and when the grading of aggregate are of same size, shape, the workability will be affected.

1) **Strength of Concrete:** When the cement fineness is not fine, means when the fineness is less than 90 percent so the strength will be decrease and the workability is increase.

2) **Rate of heat evolution during hydration:-**
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.

3) **Total heat of hydration:-** The heat of hydration affects the size of cements directly. So the finer the cement particles are, the larger the total surface area and thus the hydration will be quick.

4) **Workability of Concrete:-** The workability of concrete directly affects the fineness of cements. So when workability of concrete is decrease then less will be the fineness of cement and vice versa.

* Falling steps can be taken during transportation and placement of concrete to prevent segregation of concrete;

- 1) The concrete mix should be properly designed with optimum quantity of water i.e. not too wet nor too dry.
- 2) Make sure the concrete is properly mixed at the correct speed in a transit mixture for at least two minutes.
- 3) Transport the concrete mix correctly. Choose the shortest route for transportation of concrete mix.
- 4) Place the concrete in its final position as soon as possible. Never place a concrete form large heights.
- 5) Formwork should be water tight so that paste should not leak from the forms. Do not vibrate formwork.
- 6) Do not allow concrete to flow.
- 7) Use the vibrator correctly and never use the vibrator to spread a heap of concrete over a large area.
- 8) Vibrate the concrete for just the right time - not too long, not too less.
- 9) Use chemical admixtures such as air entraining agent in the mix. Entrained air reduces the danger of segregation.
- 10) If any segregation is observed in concrete, remixing should be done so to make it homogeneous again.