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Semester 2nd
Section A
Paper Concrete Technology

Q1 Which step is taken to prevent flash setting of cement? Also, write steps to prevent false setting of concrete?

Ans: Flash Setting:

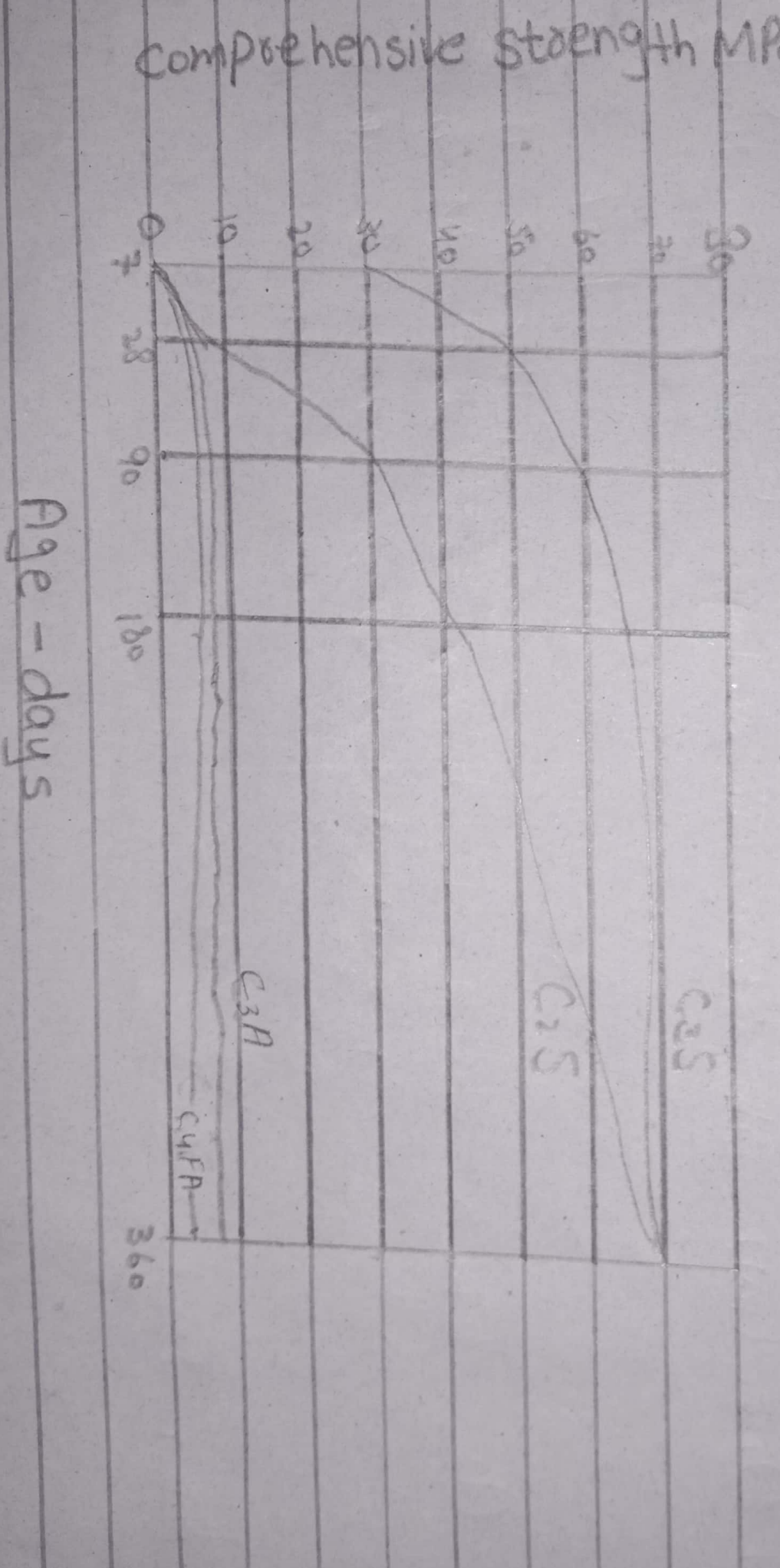
It is the immediate stiffening of cement paste in a few minutes after mixing with water. It is accompanied by large amount of heat generation upon reaction of C3A with water. Gypsum is added in cement to prevent flash setting.

False setting:

It is a rapid development of rigidity of cement paste without generation of much heat. This rigidity can be overcome and plasticity can be regained by further mixing without addition of water. In this way cement paste restore its plasticity and sets in a normal manner without any loss of strength. It may be due to dehydration of gypsum as a result of contacting hot clinker or due to activation of C3S by aeration in high humidity.

Q28 Draw a graph showing the strength development of pure compounds of cement.

Ans:



Q38 Why Type III Cement is Rapid Hardening and Type IV low Heat producing? Draw a graph showing the development of heat of hydration of different cement types.

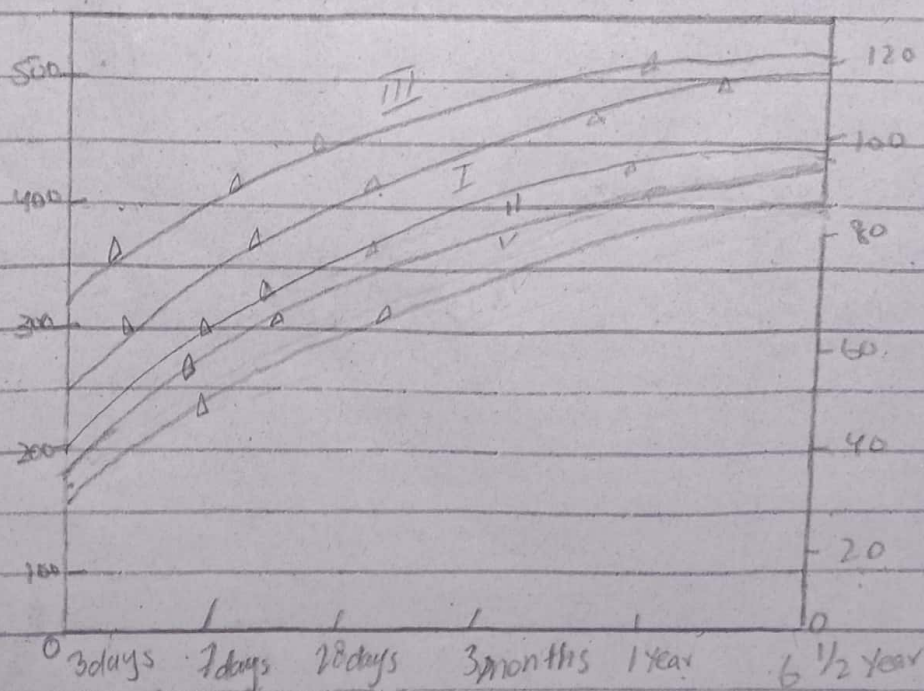
Type III cement:

Type III cement is rapid hardening because the component of type III is more finely grounded with roller and grander C_3A as compared to type IV.

Type IV Cement:

The low heat producing of type IV is due to the low content of C_3A and C_3S . The product of type IV are less finely grounded therefore the content react slowly heat of hydration.

Development of heat Hydration of different cement types.



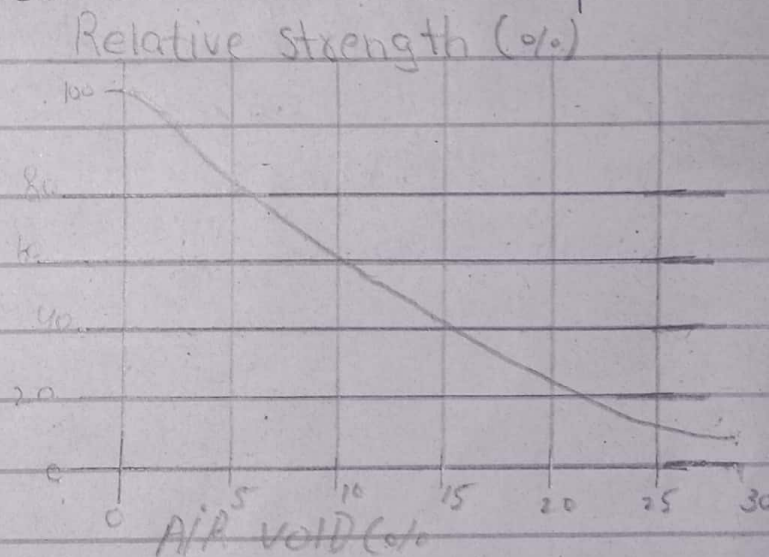
Q4 & What is the effect of compaction on entrapped air of concrete? What will be the effect on strength if concrete is not compacted sufficiently? Explain with graph.

Ans: Effect of compaction on concrete:

Compaction significantly increases the ultimate strength of concrete and enhances the bond with reinforcement. It also increases the abrasion resistance and general durability of the concrete decreases the permeability and helps to minimise its shrinkage and creep characteristics.

Effect of compaction on concrete with the help of graph.

Ans: The effect of compaction on compressive strength is dramatic. For example, the strength of concrete containing 10% of entrapped air (air voids) may be as little as 50% that of the concrete when fully compacted.



Permeability may be similarly affected since compaction, in addition to expelling entrapped air, promotes a more even distribution of pores within the concrete, causing them to become discontinuous. This reduces the permeability of the concrete and hence improves its durability.

Q5 What is the percentage of gypsum added to cement limit only to 5%?

Ans: During the cement manufacturing process when the clinker from and then cool, a small percentage or amount of gypsum is introduced during the final stage in grinding process gypsum is added to control the setting time of cement. If not added the cement will set immediately after missing of water leaving no time for concrete placing. If we exceed the percentage of gypsum then the setting time of cement will also exceed which we cannot want. So adding of 5% gypsum to cement is a fixed ratio.

Q6: What is the effect of following on the bond strength of concrete?

- i Shape of aggregate
- ii Size of aggregate
- iii Texture of aggregate
- iv Bleeding.

Ans: i: Shape of aggregate:

There are so much shape of aggregate. Rounded, Angular, Flaky, Elongated and Irregular are some types on shapes of coarse aggregates. Rounded particles are fully water worn or completely shaped by attrition. Angular particles possess well-defined edges formed at the intersection of roughly planar faces.

ii Size of aggregate:

Aggregate is a term for any particulate material. It includes gravel crushed stone, sand, recycled concrete and geosynthetic aggregates. Coarse aggregates are particulates that are greater than 4.75 mm. The usual range employed is b/w 9.5 mm and 37.5 mm in diameter.

iii Texture of aggregate:

The surface texture of aggregate can be either smooth or rough. A smooth surface can improve workability yet a rougher surface generates a strong bond between the paste and the aggregate creating a higher strength.

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iv : Bleeding :

Bleeding is a form of segregation in which water present in the concrete mix is pushed upward due to the settlement of cement and aggregate. The specific gravity of water is low due to this water tends to move upwards lower amount of fines which provides lesser surface area for water to be utilized while mixing.

Q7 What is the effect if following on workability of concrete?

Ans: The workability of concrete are materials such as water content, cement concrete, sand and aggregate properties such as size, shape, grading, mix design ratio and use of admixtures. Each and every process and material involved in concrete mixing affects the workability of concrete.

Factors which affect of workability of concrete are:

- i Cement content of concrete.
- ii Water content of concrete.
- iii Mix proportion of concrete.
- iv Size of aggregates.
- v Shape of aggregates.
- vi Grading of aggregates.
- vii Use of admixtures in concrete.
- viii Use of supplementary cementitious materials.

Cement Content of concrete:

Cement content affects the workability of concrete. In good more the quantity of cement, the more will be the paste available to coat the surface of aggregates and fill the voids b/w them. This will help

to reduce the friction b/w aggregates and smooth movement of aggregates during mixing, transporting, placing and compacting of concrete.

Mix Proportions of Concrete

Mix proportion of concrete tells us the ratio of fine aggregates and coarse aggregates w.r.t cement quantity. This can also be called as the aggregate cement ratio of concrete. The more cement is used, concrete becomes richer and aggregates will have proper lubrication for easy mobility or flow of aggregates.

Size of Aggregates

Surface area of aggregates depends on the size of aggregates. For a unit volume of aggregates with ~~big~~ large size, the surface area is less compared to same volume of ~~aggrate~~ aggregates with small sizes.

Shape of Aggregates

The shape of aggregates affect workability of concrete. It is easy to understand that rounded aggregates will be easy to mix than elongated, angular and flaky aggregates due to less frictional resistance.

Q8 : What is the effect of fineness of cement on the following ?

- i Strength of concrete.
- ii Rate of heat evolution during hydration
- iii Total heat of hydration.
- iv Workability of concrete.

1 : Strength of Concrete :

The 28 days compressive strength of concrete with or without entrained air, increases with an increase in cement fineness. The fineness of cement influences the drying shrinkage of concrete when the water content is increased because of fineness the drying shrinkage is increased.

2 : Rate of heat evolution during hydration :

Results of the study showed that cumulative heat of hydration of blended cement paste decreased as fly ash in blended cement paste was increased. For a given cement replacement level, blended cement paste containing finer fly ash released more heat of hydration when compared to coarser fly ash.

3 Total heat of hydration :

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

iv Workability of concrete :

The workability of non air-entrained concrete is increased by increasing the cement fineness in air entrained concrete the effect of fineness of cement on workability is very much less pronounced. The 28 days compressive strength of concrete with or without entrained air, increases with an increase in cement fineness.

Q9: What steps can be taken during transportation and placement of concrete to prevent segregation of concrete?

Ans: During transportation of concrete the transit mixer should be rotate smoothly.

ii: While placement of concrete, the vibrator should not be used more than 5 to 15 second.

iii: Proper mix concrete should prevent the segregation of concrete.

iv Height should not be more than 3 to 5ft of concrete pump as per ASTM.