

Name *Israr Hussain*

Id *16075*

Section *"A"*

Department *BE (C)*

Paper *Concrete Technology*

Submitted *To Engr Usama Ali*

Q:01 Which step is taken to prevent flash setting of cement? Also write steps to prevent false setting of concrete.

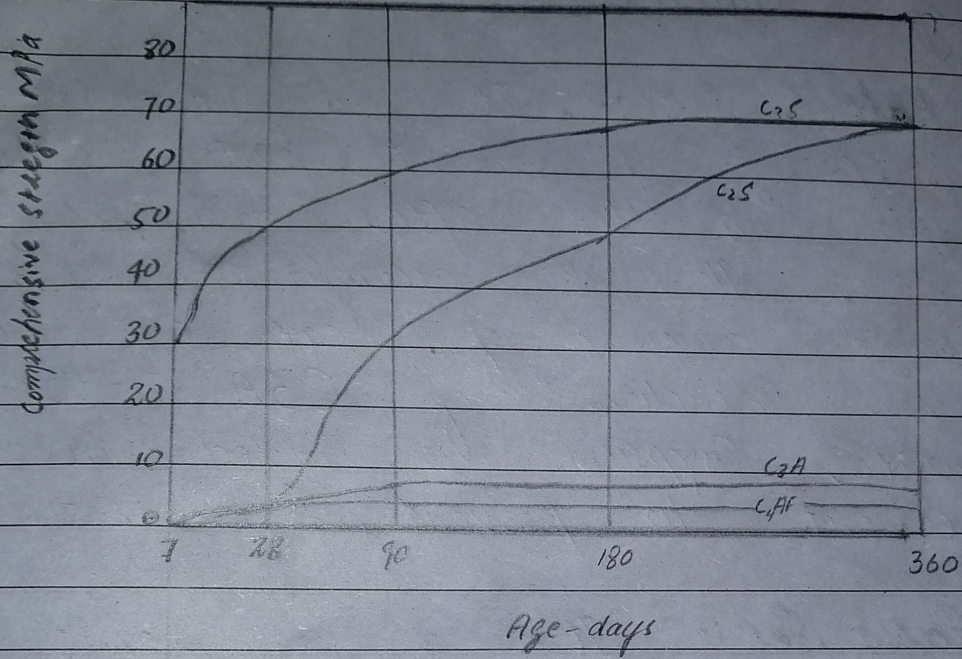
Ans. **Flash Set** :- It is immediate stiffening of cement paste in a few minutes after mixing with water. It is accompanied by large amount of heat generation upon reaction of C3A with water. Gypsum is added in cement to prevent flash set.

False Set :- 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 restores 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.

Q:02

Draw a graph showing the strength development of pure compounds of cement ?

Ans.



Development of strength of pure compounds.

Q:03

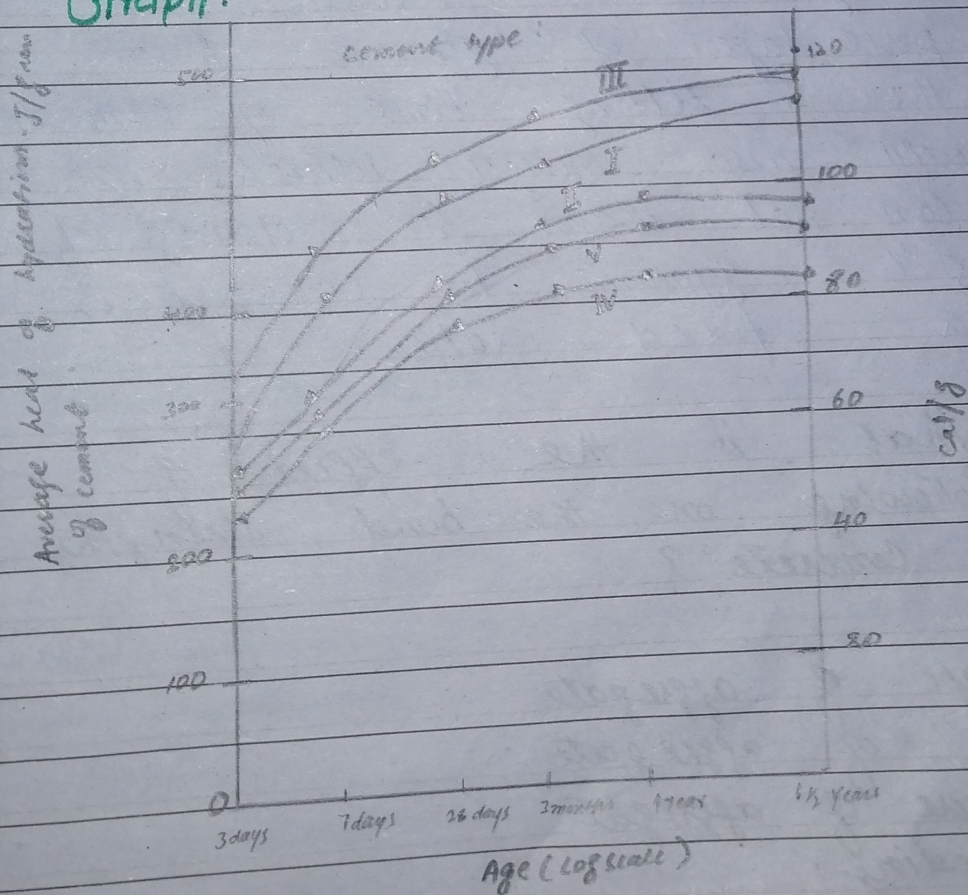
Why type III cement is Rapid Hardening and type IV Low Heat producing? Draw a graph showing the development of heat of hydration of different cement types.

Ans.

Rapid Hardening of type III cement because the initial strength is higher, but they

equalize at 2-3 months. Setting time of this type is similar to that of ordinary portland cement. The rate of strength gain occurs due to increase of C3S compound, and due to finer grinding of the cement clinker and low heat portland cement usually Type IV, develops less heat of hydration during setting and curing. This is helpful in mass concrete placements since large volumes of concrete retain and develop high temperatures during hydration without a mechanism for releasing the heat.

Graph:



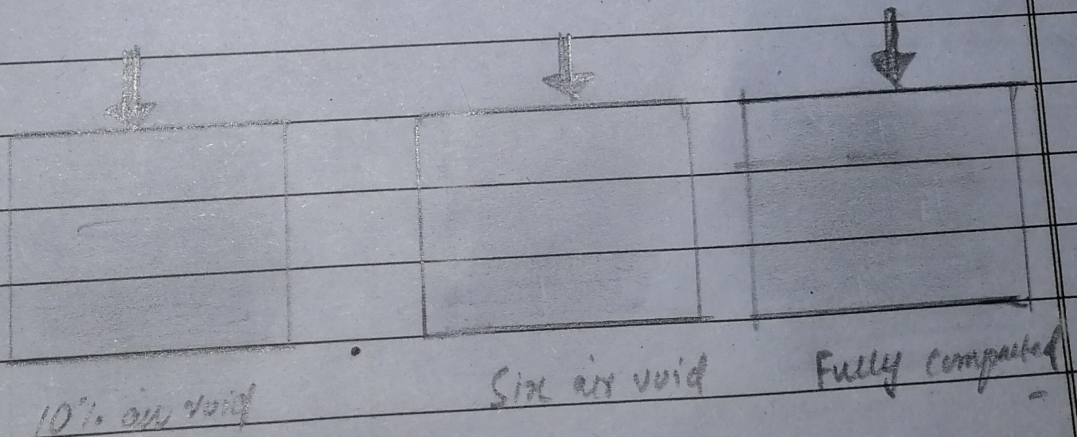
Q:04 What is the effect of compaction on entrapped air of concrete? What will be the effect on strength if concrete is not compacted sufficiently? Explain with graph.

Ans

Effect of compaction of concrete:
 ⇒ Compaction is the process which expels entrapped air from concrete from freshly placed concrete. It increases the density of concrete and significantly increase ultimate strength of concrete and enhances bond with reinforcement.

Strength of not compacted concrete:

⇒ If the concrete is not compacted then the strength of concrete will be decreases. void are created. reinforced steel will not be well covered, so that cracks will developed when harden.



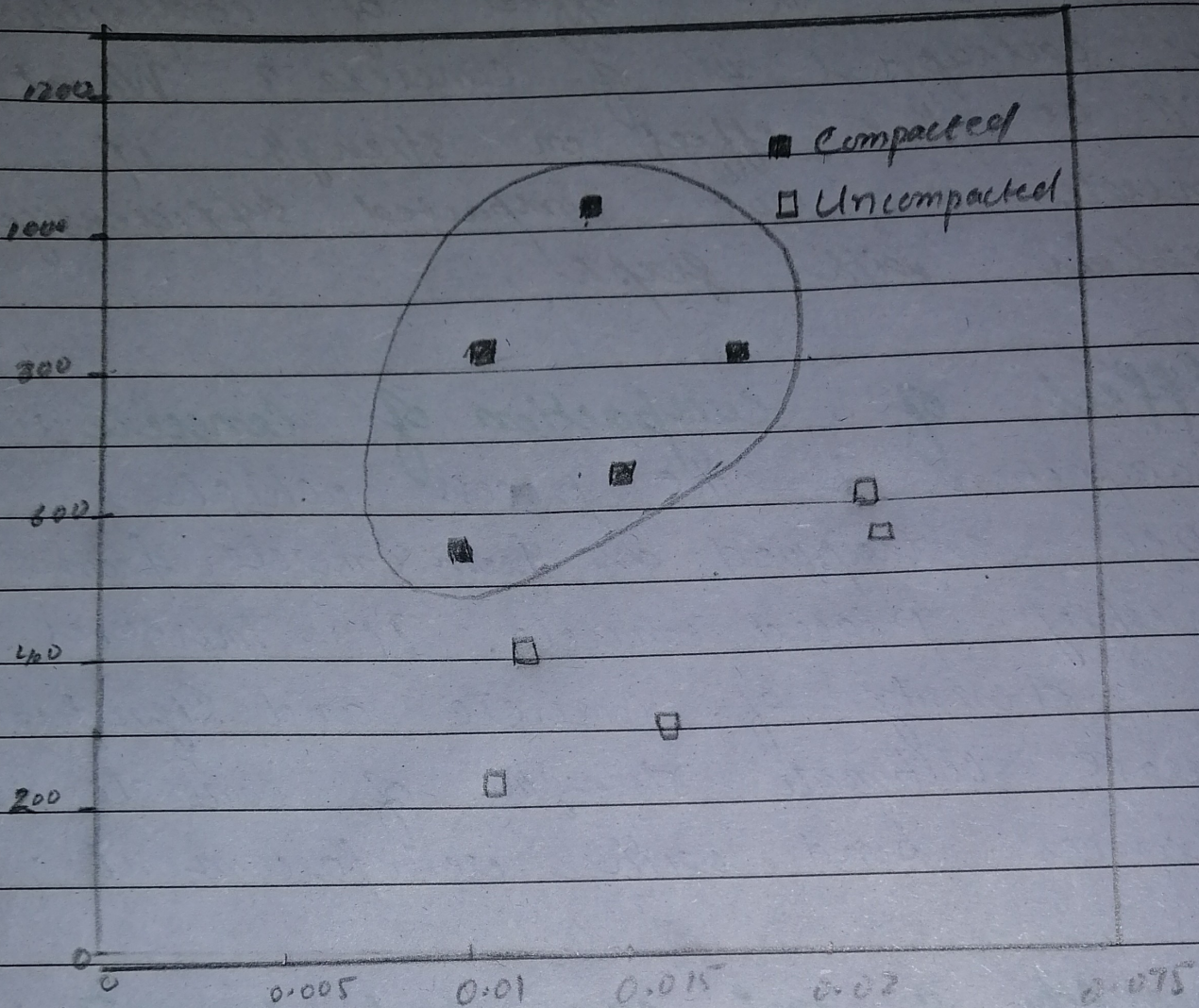
(5)

M T W T F S

H/W - C/W

Dated:/...../20.....

Graph :-



CaCO₃ content (%)

Q: 05

Why is the percentage of gypsum added to cement limited only to 5% ?

Ans

During the cement manufacturing process when the clinker form 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 mixing 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 can not want. So adding of 5% gypsum to cement is a fixed ratio.

Q: 06

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.

(i) **Shape of Aggregate**:- Round shaped or cube shaped aggregate is more workable because of the given volume or weight it will have less surface area, frictional resistance and less voids than angular or flaky aggregate.

⇒ Shape of aggregate is an important parameter in controlling the workability of concrete in case of high strength concrete of W/C less than 0.25.

(ii) **Size of Aggregate**:- The bigger the size of the aggregate, the less is the surface area and hence less amount of water is required for wetting the surface and less matrix or paste is required for lubricating the surface to reduce internal friction.

(iii) **Texture of aggregate**:- The surface texture of aggregate can be either smooth or rough. A smooth surface can improve workability, but a rougher surface generates a stronger bond between the paste and the aggregate creating a higher strength.

(iii) **Bleeding**:- also known as water gain, is a form of segregation in which some of the water in the mix tends to rise to the surface of freshly placed concrete. This is caused by the inability of the solid constituents of the mix to hold all of the mixing water when they settle down ward.

Q:07 What is the effect of following on workability of aggregate?

- (i) porosity and absorption.
- (ii) Air entraining agent.
- (iii) Coarse aggregate to fine aggregate ratio.
- (iv) Grading of aggregate.

Ans- (i) **porosity and absorption.**

⇒ Some of the aggregate are porous and absorptive. Porosity and absorption of aggregate will affect the water/cement ratio and hence the workability of concrete as well as the bond between it and cement paste.

⇒ The porosity of aggregate will also affect the durability of concrete when the concrete is subjected to freezing and thawing.

⇒ The porosity of normal rocks vary from 0 to 50%.

⇒ The ratio of the increase in weight to the weight of the dry sample expressed as percentage is known as absorption of aggregate.

(ii) **Air entraining agent:** Air-entraining agents or pore-forming agents are compounds that entrain microscopic air bubbles in cement compositions, which then harden into concrete having microscopic air voids.

(iii) **Coarse aggregate to fine aggregate ratio:**
 ⇒ There is an optimum coarse to fine aggregate ratio for RCCP. (Roller compacted concrete pavement) increasing cement from 8% to 12% has significant effect on the properties of RCCP. Coarse to fine aggregate ratio influences the porosity of RCCP. Relationship between tensile strength and compressive strength were determined.

(iv) **Grading of aggregate:** It is determining the average grain size of the aggregates before they are used in construction. This is applied to both coarse and fine aggregates. The aggregate sample is sieved through a set of sieves and weights retained on each sieve in percentage terms are summed up.

Q:08

What is the effect of fineness on the following?

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

Ans)

(i) **Strength of concrete:**

The compressive strength of concrete with or without entrained air increase with an increase in cement fineness.

(ii)

Rate of evolution during hydration:

The peak rate of heat evolution increases as the fineness of cement increases.

(iii)

Total heat of hydration

The fineness of cement affects hydration rate, and in turn, the strength increases. Fineness causes an increased rate of hydration. Bleeding can be reduced by increasing fineness.

(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 ^{much} less pronounced.

Q: 09 What steps can be taken during transportation and placement of concrete to prevent segregation of concrete?

Ans.

Steps:-

- ⇒ Check the concrete is not too wet or too dry.
- ⇒ Make sure the concrete is properly mixed. It is important that the concrete is mixed at the correct speed in a transit mixer for at least two minutes immediately prior to discharge.
- ⇒ The concrete should be placed as soon as possible.
- ⇒ Always pour new concrete into the face of concrete already in place.
- ⇒ Use certain workability agents. pozzolanic material and air entraining agents can significantly reduce segregation.
- ⇒ Avoid excessive compaction by vibration of too wet mix.
- ⇒ If placing concrete straight from a truck, pour vertically and never let the concrete fall more than one and a half meters.