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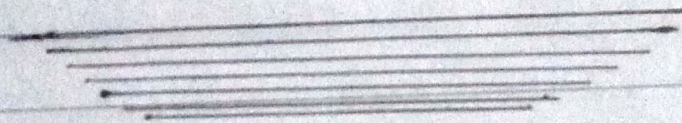
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SUBJECT :: CONCRETE  
TECHNOLOGY

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OSAMA ALI

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Q<sub>1</sub>

Ans

Immediate hardening of cement past in a few minutes after adding to ~~the~~ water to the cement paste is called flash setting time of cement. Gypsum are added to prevent the flash setting time of cement. Therefore the addition of gypsum is not exceed than 3 to 5 percent.

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### False Setting of concrete

1.

The plasticity of concrete can also regained by feathered mixing but without adding of water. In this method the paste came into its normal manner without loss in its strength.

2.

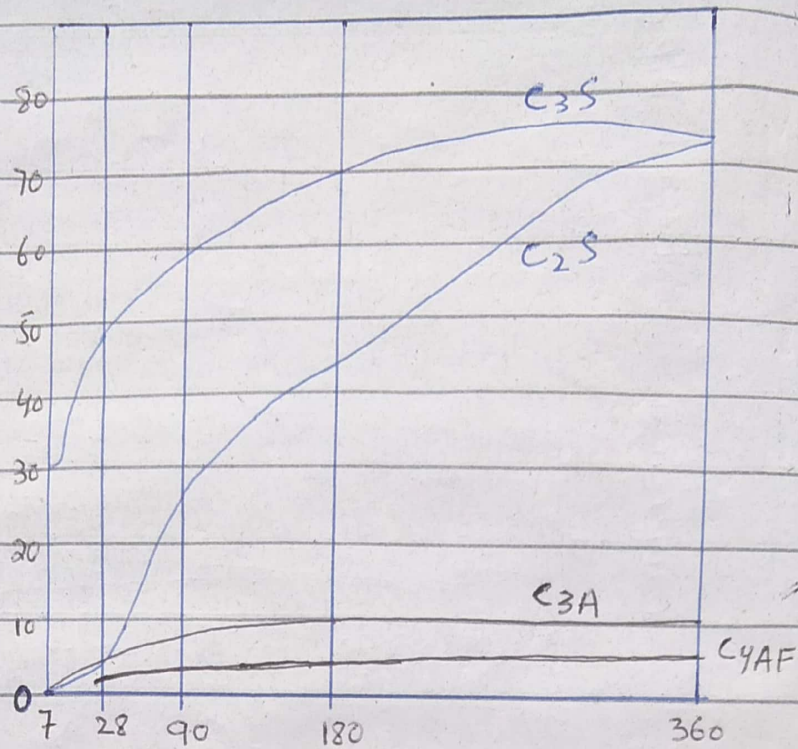
The hardness of concrete can be regained by further mixing without addition of water.



Q 2

Ans.

comprehensive strength MPa



Age - days.

Q 3) Rapid Hardening Portland Cement (III)  
(Type III)

Ans.

This type develops strength more rapidly than ordinary portland cement. The initial strength is high but they equalize at 2-3 months. Type III cement is rapid hardening because it is due to increase in C<sub>3</sub>S and C<sub>3</sub>A, and its higher fineness.

(C<sub>3</sub>S) (tri-calcium silicate)

(C<sub>3</sub>A) (tri-calcium aluminate)

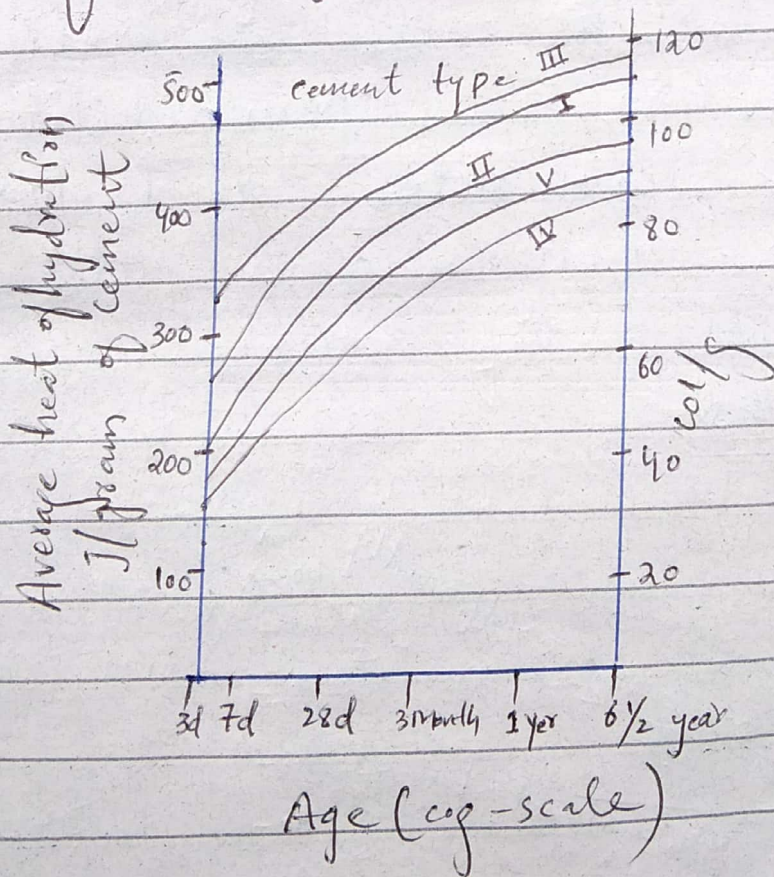
PTD



2 Low heat Portland cement (type IV)

Type IV cement is low heat producing cement because its composition contains less tri-calcium silicate (C<sub>3</sub>S) and tri-calcium Aluminate (C<sub>3</sub>A) percentage, and higher percentage of C<sub>2</sub>S in comparison with ordinary portland cement.

Development of heat of Hydration of different cement types.



P.T.O

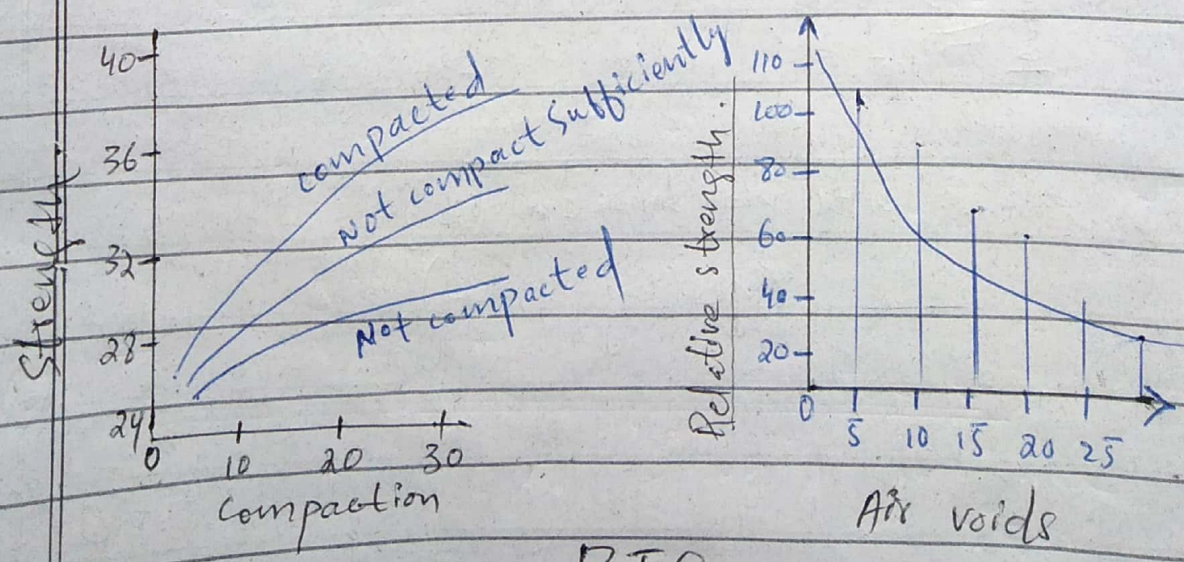


Q4  
Ans

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

In addition to expelling entrapped air promotes a more even distribution of pores within the concrete, causing them to become discontinuous this reduce the permeability of the concrete and hence improve strength and the durability of concrete.

\* Graphs



P.T.O



Q<sub>5</sub> Gypsum is called the retarding agent of cement which is mainly use for regulating the setting time of cement. If the content of gypsum is too little, the retardation affect will be ~~unobvious~~ unobvious. Too much gypsum will accelerate the setting time of cement because gypsum can generate a clotting agent itself. The limited amount of gypsum depends on the content of  $C_3A$  in the cement and that of  $SO_3$  in gypsum and is also related to the fineness of cement. and content of  $SO_3$  in clinker, that is why the amount of gypsum is 3-5% of the cement's mass if the amount of gypsum ~~is~~ exceeds the limit, it will lower the strength of cement and it can lead to poor dimensional stability which will cause the expanded destruction of cement paste.



Q. ① Shape of aggregate ::

Ans. shape of aggregate directly effect the strength of concrete. Angular aggregates assure high compressive strength in concrete because of the interlocking b/w the angular aggregates due to their higher specific surface area.

② Size of aggregate ::

Size of aggregate is also directly effect the strength of concrete, It is 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 size aggregate increase flexural strength.

③ Texture of aggregate ::

A smooth surface  
P.T.O



can improve workability yet a rougher surface generates a stronger bond b/w the paste and the aggregate creating a higher strength.

#### ④ Bleeding

Bleeding is mainly observed in a highly wet mix proportioned and deficient mixed concrete, in thin member like roof slab or road slab. When concrete is placed in sunny weather show excessive bleeding which effect the bond strength of concrete.

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① Strength of concrete ∝

Fineness of cement affects hydration rate hence the rate of strength gain. Finer cement reacts faster with water and the rate of development of strength and corresponding heat of hydration is high.

② Rate of heat evolution during hydration ∝

Heat of hydration of cement is directly proportional to fineness of cement. Finer the cement, the greater will be hydration and vice versa.

③ Total heat of hydration ∝

The finer cement reacts faster with water and the rate of development of strength and corresponding heat of hydration is high.



## 4) Workability of concrete

Bleeding can be reduced by increasing fineness however, increase fineness can also lead to the requirement of more water for workability. As a result in a higher possibility of dry shrinkage thus fineness of cement effect the workability of concrete.

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

P.T.O



Segregation could result from internal factors such as concrete that is not proportional properly and not mixed well, or too workable. a mix, external factors are too much vibration, improper transportation, placement, or adverse weather conditions.

### \* Prevention of Segregation in concrete:

- ① Always use concrete which is pre-designed with optimum quantity of water i.e not too wet nor too dry.
- ② Field quality control must be maintained while handling, transporting, placing and compacting and finishing concrete.

P.T.O



- ③ concrete should not be allowed to fall from greater height. It should be placed as near its final position as possible.
- ④ Admixtures, such as pozzolanic materials or air entraining agent should be used to avoid segregation.
- ⑤ If at any stage segregation is observed then remixing should be done to make the concrete again homogeneous.

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END



## Q7 Ans. ① Grading of Aggregate %

Well-graded aggregate tend to fill up voids and easily get workability. Less amount of water can make it workable. Due to excess paste the mixture gets cohesive and prevent Segregation. It also make it get compacted easily that is increase the workability of concrete.

## ② Air Entraining Agent %

The common effects of air entraining agent to concrete are freeze-thaw resistance along with increase workability decrease strength, reduce strength and segregation. Air entrained concrete are more ~~to~~ to show resistance to weathering cycles. It increases the workability of

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concrete without increasing in water-cement ratio.

### ③ Porosity and Absorption

Some of the aggregate are porous and absorptive.

Due to this quality the aggregate gain much water than the required ratio, and also effect the workability of concrete as well as bond b/w it and cement paste.

Normal porosity of rocks starts from 0 to 50%.

### ④ Coarse to fine aggregate ratio:

coarse to fine aggregate ratio also effect the workability of concrete, if fine aggregate is much as compare to the coarse it effect its strength, and if fine is less as required it will cause free voids. That is why 9% to 12% of increasing cement has significant properties on RCC.