

Q. NO. 01

ANSWER:

⇒ Flash setting time of cement is a immediate hardening of cement paste in a few minutes after adding water to the cement paste. and gypsum are added to prevent flash setting time of cement. The addition of gypsum is not exceed than 2 to 5%.

False setting of concrete
step:

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

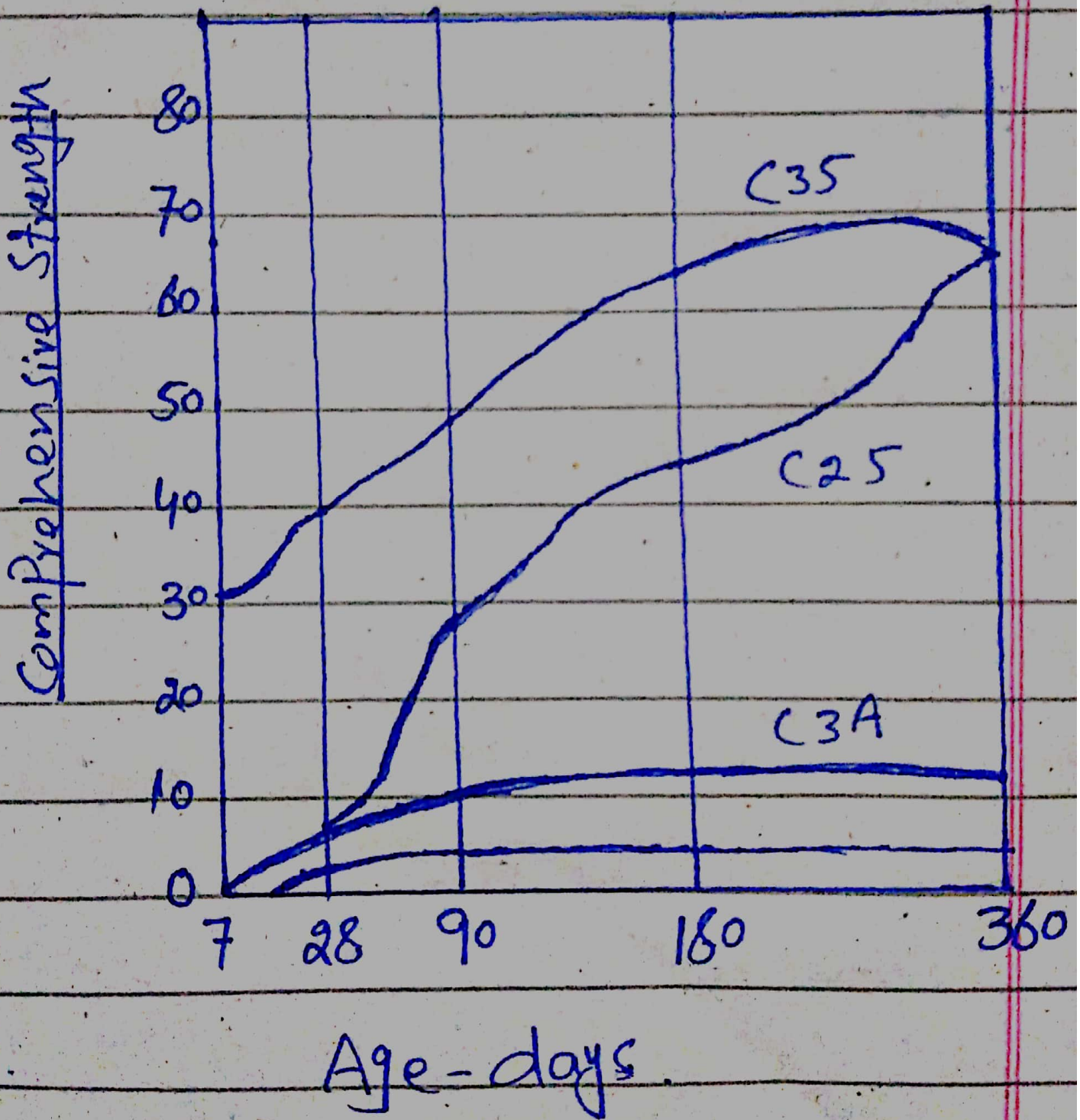
(Q No. 1 continue)

2

2:- The plasticity of concrete can also be regained by further mixing without addition of water. In this method paste come into its normal manner without loss in its strength.

(Q No: 02)

ANSWAR



ANSWER:-

1. Rapid Hardening Portland Cement (type III):-

⇒ This type develops strength more rapidly than ordinary portland cement. The initial strength is higher, but they equalize at 2-3 months. Setting time for this type is similar for that of ordinary portland cement. The ~~ratio~~ rate of strength gain occur due to increase of C_3S compound and due to finer grinding of the cement clinker. (The min fineness is $3250 \text{ cm}^2/\text{g}$ according to I.Q.S.S). Rate of heat evolution is

Q No 3. continue

(2)

Higher than in ordinary portland cement. due to the increase in C_3S and C_3A , and due to its higher fineness. Chemical composition and soundness requirements are similar to that of ordinary portland cement.

USES:-

(a) The uses of this cement is indicated where a rapid strength development is desired (to develop high early strength. i.e. its 3 days strength equal that of 7-days ordinary portland cement). for example.

i) When form work is to be removed for re-use

(3)

ii) Where sufficient strength for further construction is wanted as quickly as practicable, such as concrete blocks manufacturing, side walks and the places that cannot be closed for a long time, and repair works needed to construct quickly.

b) For construction at low temperature, to prevent the frost damage of the capillary water.

c) This type of cement does not use at mass concrete constructions.

Q no. 3 continue.

(4)

2:- Low Heat Portland Cement (Type-IV).

⇒ It's composition contains less C_3S and C_3A percentage, and higher percentage of C_2S in comparison with ordinary portland cement.

Properties:- 1) Reduce and delay the heat of hydration.

2) it has lower early strength compared with ordinary portland cement.

3) It's fineness is not less than $3200 \text{ cm}^2/\text{g}$.

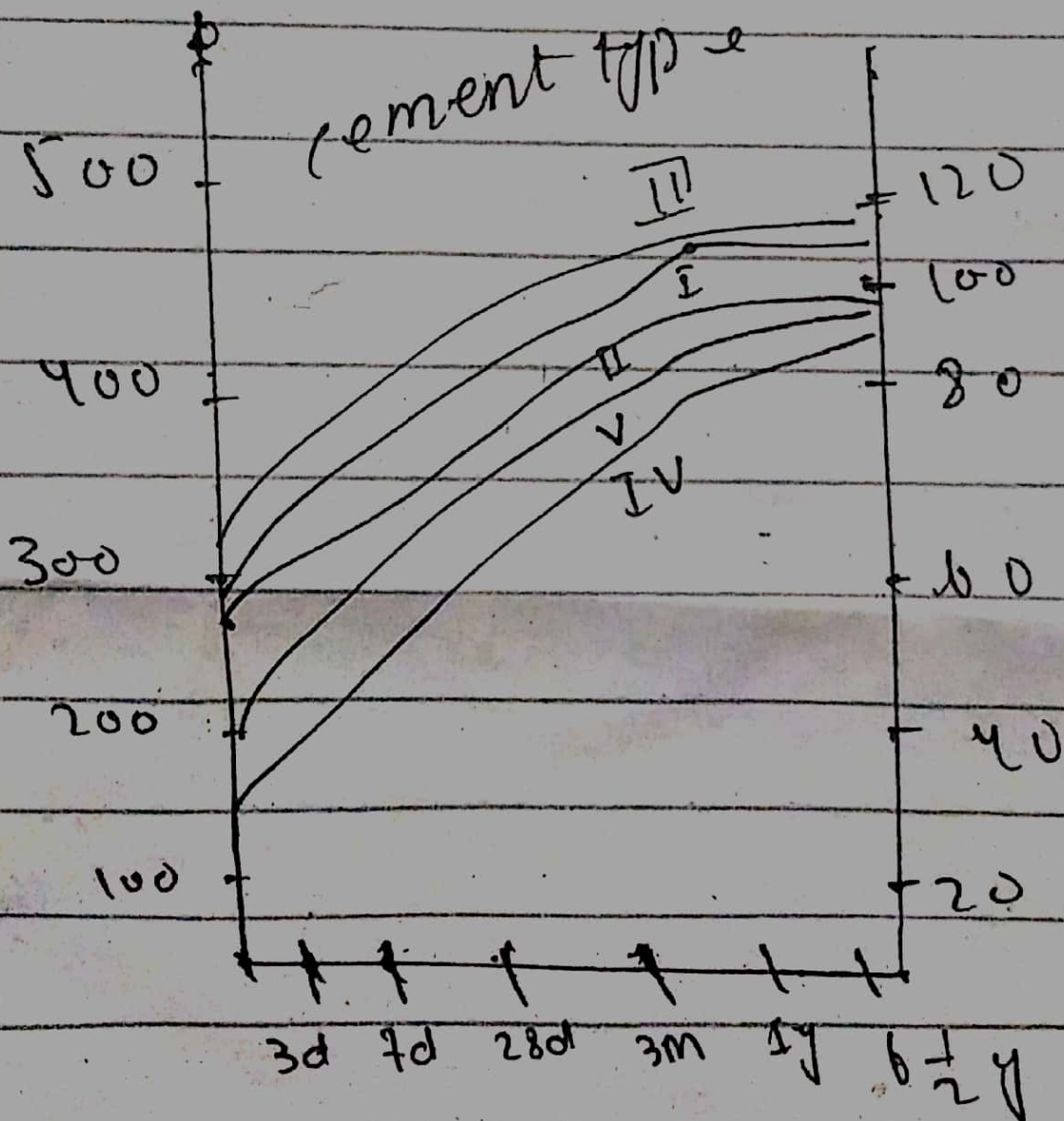
Uses:- it is used in mass concrete constructions: the

rise of temperature in mass concrete due to progression in heat of hydration cause serious

cracks. So, it is important to limit the rate of heat evolution in this type of construction, by using the low heat cement.

5 (Q.No.03 continue)

Development of heat of hydration of different cement types.



(1)

Q. NO. 4

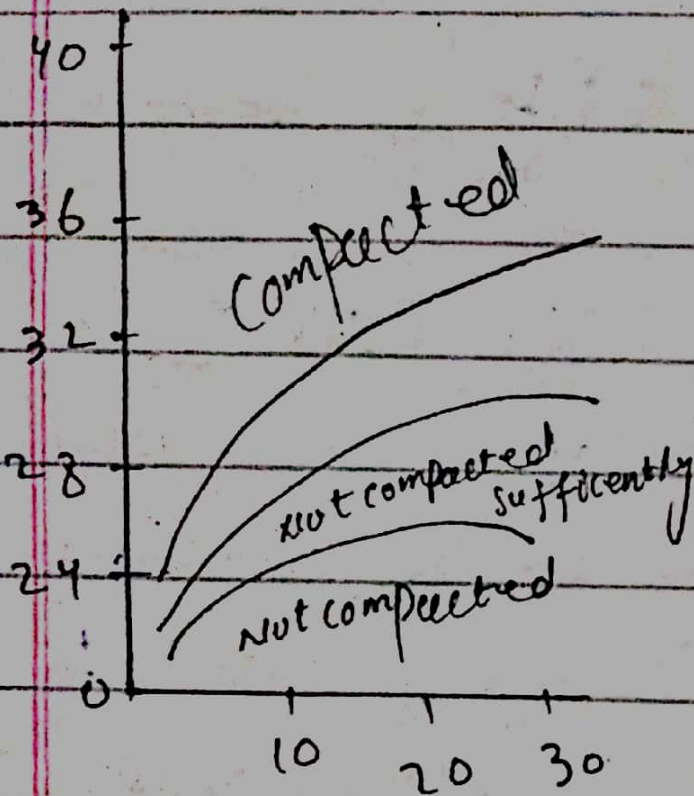
Q. NO. 4

ANSWER:-

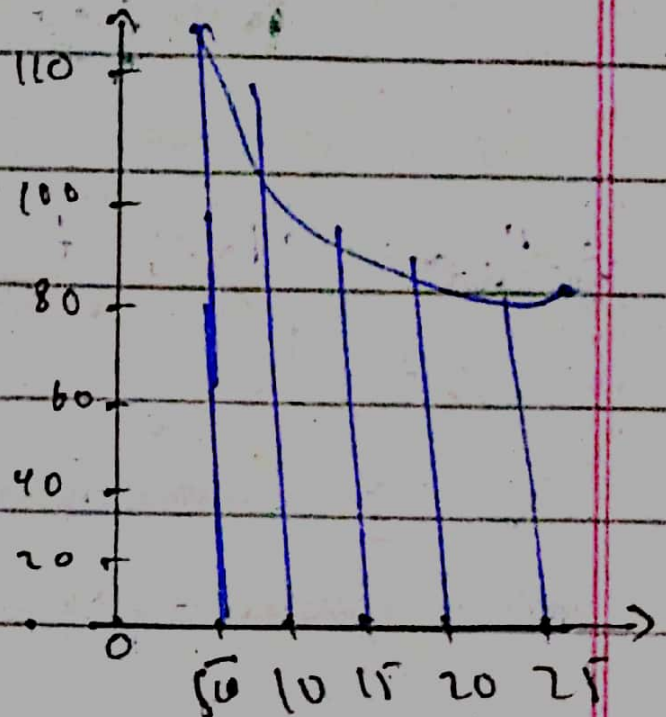
⇒ The strength of concrete containing 10% of air voids may be little as compare 50% that of the concrete, when fully compacted. The effect of compaction on strength of concrete is dramatic. In addition to expelling entrapped air promotes a more even distribution of pores within the concrete, causing them to become discontinuous. This reduce the permeability of the concrete and hence improve strength and the durability of concrete.

②

Cytoph! (Q.4-continue)



Compaaction



Air voids

(QNO:- 05)

ANSWER

Gypsum is called the retarding agent of cement which is mainly used for regulating the setting time of cement and is an indispensable component.

If 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 content of C3A in the cement and that of SO₃.

in gypsum, and it also related to the fineness of cement and the content of SO_3 in clinker. The amount of gypsum should account for 3% - 5% of the cement's mass. If the content 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 content of SO_3 should not be more than 3.5%.

(1)

(Q NO :- 06)

ANSWAR

(i) Shape of aggregate.

Particle shape principally affects the w/cm by its effect on water demand and amount of paste required for workability of a given mixture. Also, the bond with the cement paste may be weakened due to accumulation of bleed water under the relatively large surface areas of flat particles of aggregate. At the same w/cm, concrete with angular crushed stone aggregate ordinarily has a higher flexural strength than concrete with rounded

(2)

(ii) Size of aggregate.

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

(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

(3)

a stronger bond between the paste and the aggregate creating a higher strength.

(iv) **Bleeding**:- Bleeding in concrete may be considered as the physical migration of water towards the top surface. it is not always favorable as it increases finishing time, produces laitance at the surface, decreases strength wear resistance and bond strength and causes poor bonds between successive lifts.

(Q No :- 07)

P No 1

ANSWER

(i) Porosity and absorption.

When flat or elongated particles are contained in the coarse aggregate, the quantities of sand, cementitious material, and water must be increased.

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.

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degree of workability, latter will require less water. overall, this factor is only of secondary importance.

(ii) Air Entraining agent.

The general effects of air entraining are freeze thaw resistance along with increase workability decreases strength, reduce bleeding and segregation. Air entraining concrete is more resistant to weathering cycles than plain concrete.

(iii) Coarse aggregate to fine aggregate ratio.

there is an optimum coarse to fine aggregate

(P No 3)

Ratio for RCCP.
increasing cement from
9% to 12% has
significant affect on the
Properties of RCCP.
Coarse to fine aggregate
Ratio influence the Porosity
of RCCP. Relationship
between tensile strength
and compressive strength
were determined.

(iv) Grading of Aggregate.

Aggregate gradation also
affects the Properties
of concrete. if all
Particles of aggregate
are of uniform size,
the aggregate may not
be compacted properly.
on the contrary, if
the aggregate is well
graded and its particle

are composed of different sizes than at the time of compaction, the smaller particles fill the voids between the larger ones. Thus, concrete made of well graded aggregate is denser and contains fewer voids.

Q.NO. 08

Answer:-

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 Ratio of heat evolution during hydration:-

⇒ Hydration of heat is directly ~~prop~~ related to fineness of cement.

Finer the cement greater will be hydration and vice versa.

(3) Total heat of hydration:-

⇒ The finer cement react 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 affect the workability of concrete.

ANSWAR

Segregation of concrete.

In concrete, the constituent material is cement, sand, aggregate, and water. Generally, a concrete aggregate is coated with cement and sand to form the uniform mass. Separation of these constituent materials of concrete from each other is defined as segregation of concrete.

Types of segregation.

- (1) Separation of coarse aggregate from the paste.
- (2) Separation of coarse aggregate paste from the concrete.

(3) Separation of ~~water~~ water from the cement mix which is also known as bleeding.

The segregation includes undesirable properties in the hardened concrete.

it can also cause honeycombing in concrete.

segregation also has ill effects on durability.

compressive strength and all other characteristics of concrete.

it also leads to the development of cavities in the concrete surface.

Causes of Segregation

The root cause of segregation of concrete is difference in specific gravity and size of its constituent material.

P No 3

Specific gravity of water is 1. Specific gravity of cement is around 3.15. While that of aggregate is 2.6 to 2.7. Due to difference in specific gravity lighter particles have tendency to move upward and heavier particles tend to move downwards. This results in segregation of concrete. Other causes include high water cement ratio in concrete. Adding excess water while mixing concrete may lead to segregation. Incorrect vibration for too long on wet mix of concrete may lead to heavy material setting down and lighter cement sand

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Paste to move upwards. incorrectly Proportioned mix and improper placing on site may also result in Segregation.

segregation can also occur when concreting is done from a height more than 1 metre. it may also occur due to vibrations during transport of concrete. in such cases Proper remixing should be done but before the setting time is over.

Prevention of segregation
Segregation of concrete can be prevented by correctly Proportioning the mix and using

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the recommended water-cement ratio so as to prevent using excess water. care should be taken while handling placing transporting compacting and also at finishing stages. Properly using air entraining agent admixtures, Pozzolanic material can also prevent segregation.

As mentioned earlier, remixing the concrete for a short period of time may also prevent segregation. in a case where the depth of concrete is more than 1.5 meter, it should be placed through inclined chutes. the end of the chute should be as close to the point of concrete

(Prob 6)

as possible. The angle of inclined should be kept so as to allow smooth travel of the concrete. Also, lubrication the path using a small quantity of water at regular intervals.

Bleeding in Concrete.

Segregation in concrete is commonly thought as segregation of some size groups of segregation from cement mortar in isolated location with corresponding deficiencies of these materials in other location. Segregation results in proportion of the laid concrete being in variation to those as designed. Segregation could result from internal factors

6 (P No 7)

such as concrete that is not Proportioned Properly and not mixed adequately, or too workable a mix it also could result from external factors such as too much vibration improper transportation, Placement, or adverse weather conditions the corresponding increase in Proportion of cement Paste in upper areas would tend to make them susceptible to increased shrinkage and formation of cracks. We can avoid happening of segregation by:

- 1- The concrete mix should be Properly designed with optimum quantity

(P No 8)

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- Admixtures, such as Pozzolanic materials or air entraining agent should be used to avoid Segregation. Air entraining Permits a reduction of

P No 9

the mixing water with
no loss of slump
which increases workability
and decreases segregation
and bleeding.

5- concrete should not
be allowed to fall
from greater heights. it
should be placed as
near its final position
as possible.

Asphalt/Bitumen Testing:

segregation is the segregation
of aggregates from the
cement matrix. when the
concrete is poured freely
from a height more
than 1m, the aggregates
will be thrown separately

(P No 10)

first and the cement matrix will follow them and accumulated at the top.

To avoid segregation

- 1- Mix should not be allowed to fall free from heights.
- 2- remixing at the sites
- 3- Choosing proper size of aggregates and aggregates to cement ratio
- 4- Applying viscosity Modifying Admixtures which will give cohesiveness to the mix.

The end