NAME : Abdul Basit Khan
ID = 16319
Subject = concrete technology
section = "B"
Department = "civil"

Q1:- Which step is taken to prevent flash setting of cement? Also write steps to prevent false setting.

Ans:- Gypsum are intentionaly added to portland cement to regulate early hydration reactions to prevent flash setting, improve strength developement and reduce drying shrinkage. Sulfate and alluminate are also present in supplementary cementions materials.

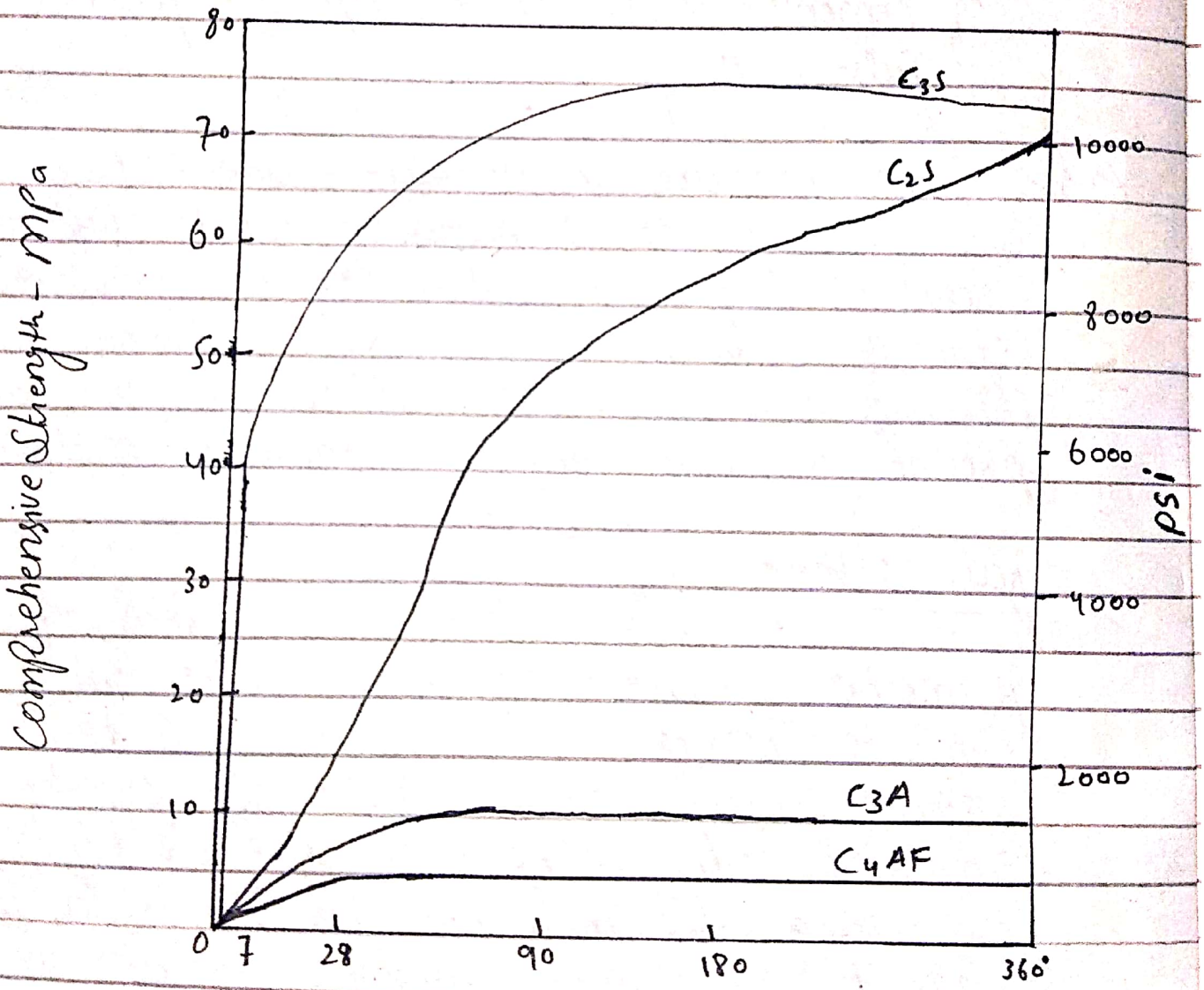
False setting:-

False setting is a form of premature stiffening of the paste or concrete which occurs within 1 to 5 minutes after mixing. false set can be eliminated by continous mixing or by rewarking and may not be notice on jobs supplied by truck mixer or with center mixed concrete that is agited during delivering to the site.

Q2:- Draw a graph showing the strength developement of pure compound of cement.

Ans:-

Graph:-



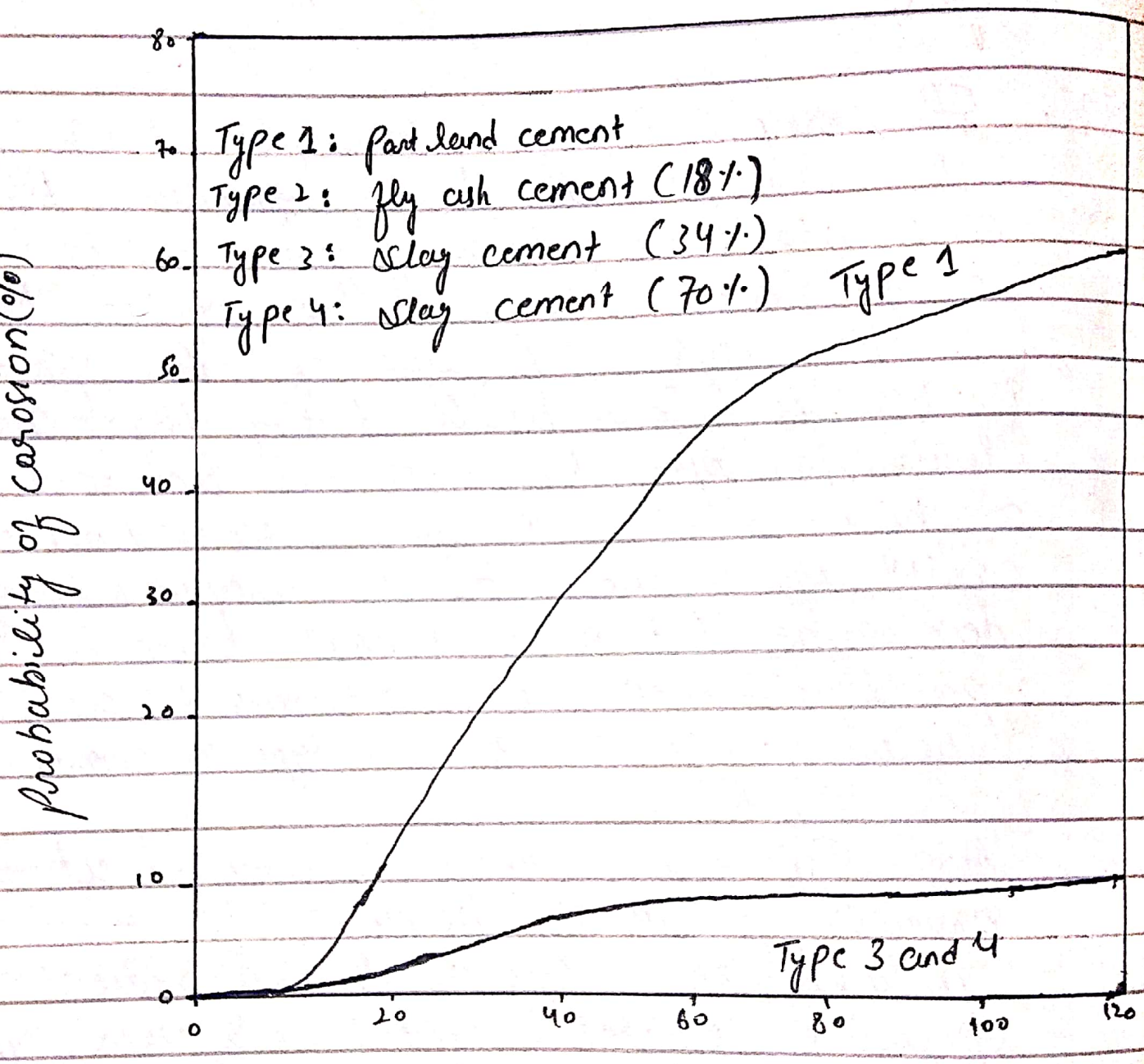
Q3:- Why type III cement is rapid hardening and type IV low heat producing, Draw a graph showing the developement of heat hydration of different cement types.

Ans:- The rapid Strength developement of type III cement is achived by grinding the cement to a very high fineness 7000 to 9000 cm²/g Because of this the gypsum has to be hieghet. Because of this fineness it has a low bulk density. High fineness leads to rapid hydration and thedeare to a high rate of heat generation at early ages and to a rapid Strength developement (7 days Strength of rapid hardening portland cement can be reached at 24 hours when using this type of cement.

And Type IV cement is low heat producing cement because it is manufactured from the ingredients of specially selected cement clincker, gypsum and ground granulated blast-furnance slag which result in significantly lower heat generation during the process of hydration than in a typical portland cement

p.t.o

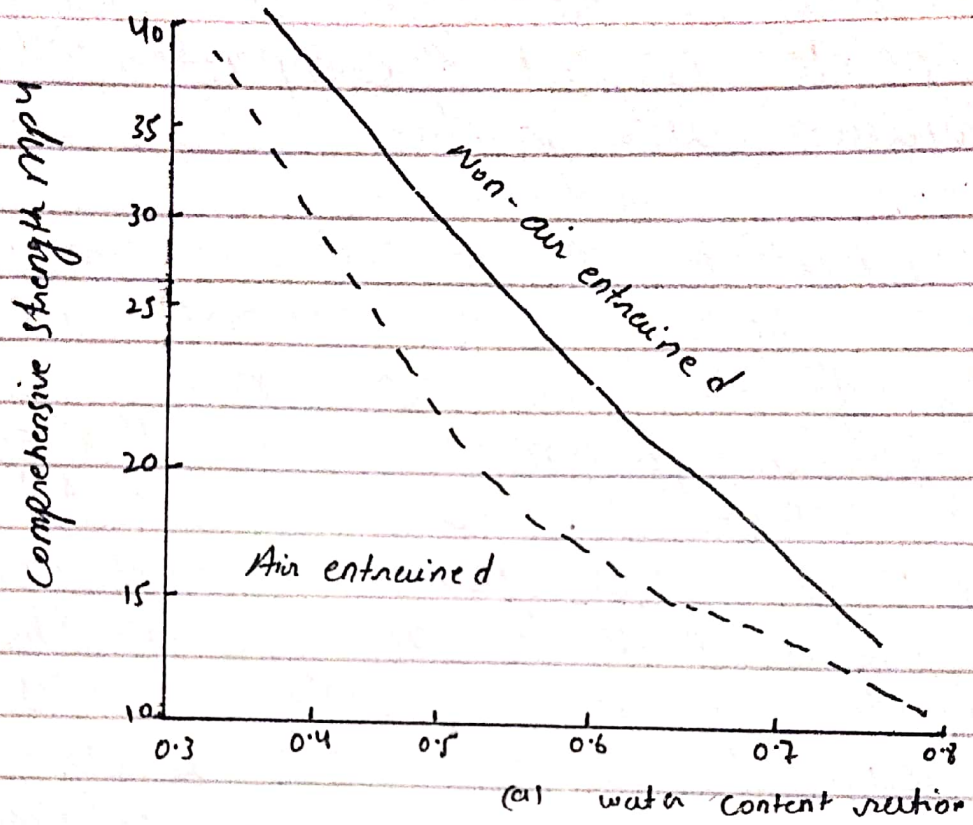
Graph:-

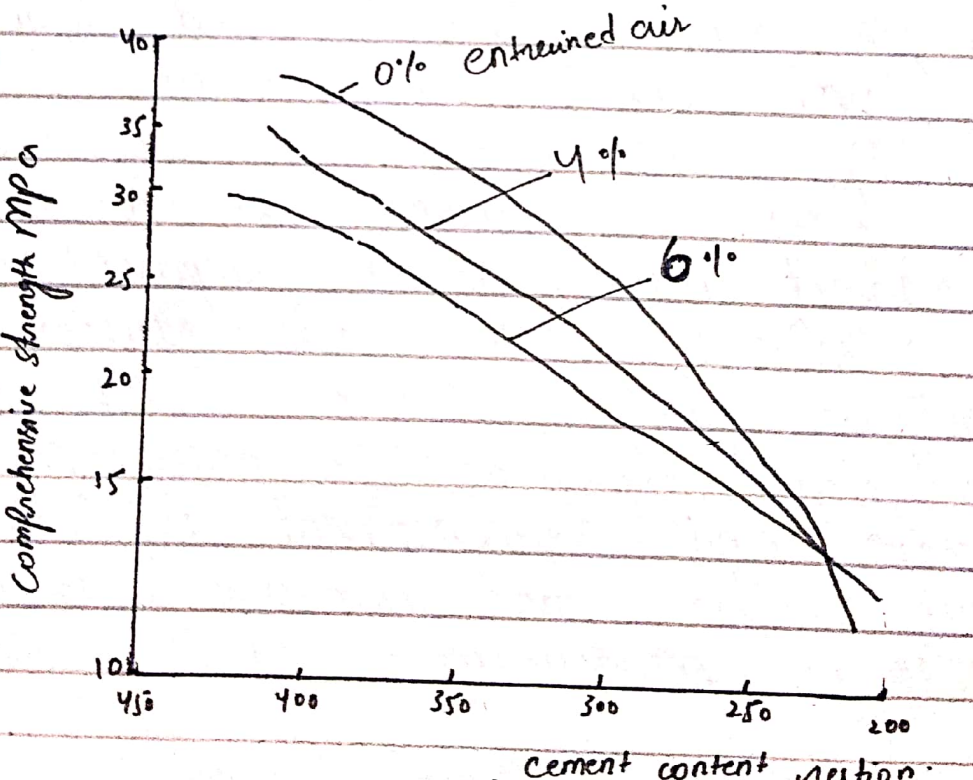


Q4:- What is the effect of compaction on entrapped air of cement? What will be the effect on strength if concrete is not compacted sufficiently Explain with graphs.

Ans:- Compaction of concrete is an operation in which fresh concrete is compacted in forms and make it encircle reinforcements and other embeded objects such as tubes in mold. It is the process which expels entrapped air from concrete and packs the aggregates particles together so as to increase the density of concrete. It increase significantly the ultimate strength of concrete and chances the bond with reinforcement. But, if compaction is not carried out as required, as a series do effect may become apparent and the concrete slab will suffer from significant loss of strength without compaction the bond between concrete and reinforcement will be weak. Also the shrinkage characteristics will be maximum.

Graph :-





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

Ans:- In cement gypsum amount is controaled to 2 to 4% ar 5% of cement to control flush set. Extra amount may be harmful. If you add extra amount of gypsum in the cement it will effect the setting time (reduce the expected setting time) and if there is an excess amount of gypsum in cement it will make crack by forming an ettringite.

Q6:- What is the effect of following on the bond strength of concrete?
(1) Shape of aggregate.
(2) Size of aggregate.
(3) Texture of aggregate
(4) Bleeding.

Ans:-
(1) Shape of aggregate:-
Crushed stone produce much more angular and elongated aggregates which have a higher surface to volume ratio better bond characteristics but required more cement paste.

(2) Size of aggregate:-

On increasing the maximum grain size to 120-180 mm the reduction in tensile strength is 30-50% as compared with concretes with maximum aggregate size 20 mm.

(3) Texture of aggregate:-

Texture of aggregate effects the bond strength of concrete. Texture can be either smooth or rough smooth surface reduce the bond strength due to less friction.

(4) Bleeding:-

Bleeding in concrete may consider as the physical migration of water towards the top surface. It is not always favourable as it increases finishing time produce laitance at the surface, decrease strength, wear resistance in bond strength and causes poor bonds between successive lifts.

Q7:- What is the effect of the following on workability of concrete?
(1) Porosity and Absorption
(2) Air entraining agent
(3) Coarse aggregate to fine aggregate.
(4) Grading of aggregate.

Ans:-

(1) Porosity and absorption:- The porosity and absorption of aggregate is important consideration because some water added is absorbed by aggregate, hence affecting workability.

(2) Air entraining agent:- Air entraining effects comprehensive Strength of concrete and its workability. It increases the workability by concrete with out much increase in water cement ratio.

(3) Coarse aggregate to fine aggregate:-

- Coarse aggregate tends to increase workability provided there is no particle interference.
- Fine aggregate generaly decrease workabily finer aggregate may lead to Sticky mixes.

(4) Grading of aggregate :-

Well gradded aggregates tends to fill up voids easily get workability & grading is not good then the workability of concrete will be not so good and if grading is better then there will be fewer voids and excess paste will be available to give better lubricating effect.

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

(1) Strength of concrete
(2) Rate of heat evalution during hydration.
(3) Total heat of hydration
(4) workability of cement.

Ans:-

(1) Strength of concrete:- The fineness of cement influences the drying shrinkage of concrete when the water content is increased because of fineness, the drying shrinkage is increased. The 28 days compression strength of concrete with or without entrained air, increases with increase in cement fineness.

(2) Rate of heat evalution during hydration:-

Partially replacing cement with fly ash of different fineness, decreased the cumulative heat evalution. the reduction in heat evalued increased with an increase in fly ash content. fly ash generated more heat of hydration.

(3) Total heat of hydration:- The rate of heat generation increases as cement finenes increases and result indicates that increase of cement fineness has no effect on total heat of hydration at 7 days.

(4) Workability of concrete:- When fineness of cement increases beyound a certain particle size, the particles of cement itself start acting as lubricants in the concrete. Therefore the particles flow and less effort is required for compaction of concrete. i.e. The water demand decreases to obtain the same degree of workability.

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

Ans:- Segretion in concrete is commonly thought as seperation of some size groups of aggregates from cement mortar in isaleted locations with corresponding dejicencies of these materials in other locations.
segregation could result from internal factors such as concrete that is not proportioned properly and not mixed adequately. It could result from external factors also such as too much vibration improper transportation placement, or adverse weather conditions.
we can avoid happening of segregation by

(1) The concrete mix should be properly designed with optimum quantity of water to make a cohesive mix. Such concreate will not exhibit any tendency for segregation.

(2) feild quality control must be maintained while handling, transporting, placing and compacting and finishing concrete.

(3) while transporting or placing if at any stage segregation is observed, then remixing should be done to make concrete homogenous.

(4) Admixtures, such as pozzolanic materials

or air entraining agent should be used to avoid segregation. Air entrainment permits a reduction of the mixing water with no loss of slump which increase workability and decrease 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.