

**IQRA NATIONAL UNIVERSITY**

**DEPARTMENT: CIVIL ENGINEERING**

**PAPER: CONCRETE TECHNOLOGY**

**EXAM: MID TERM**

**SEMESTER: 2<sup>ND</sup>**

**STUDENT:16595**

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**QUESTION:-1 WHICH STEP IS TAKEN TO PREVENT FLASH SETTING OF CEMENT? ALSO, WRITE STEPS TO PREVENT FALSE SETTING OF CONCRETE**

**Answer:-**

**❖ Flash Set**

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 set.

**❖ False Set**

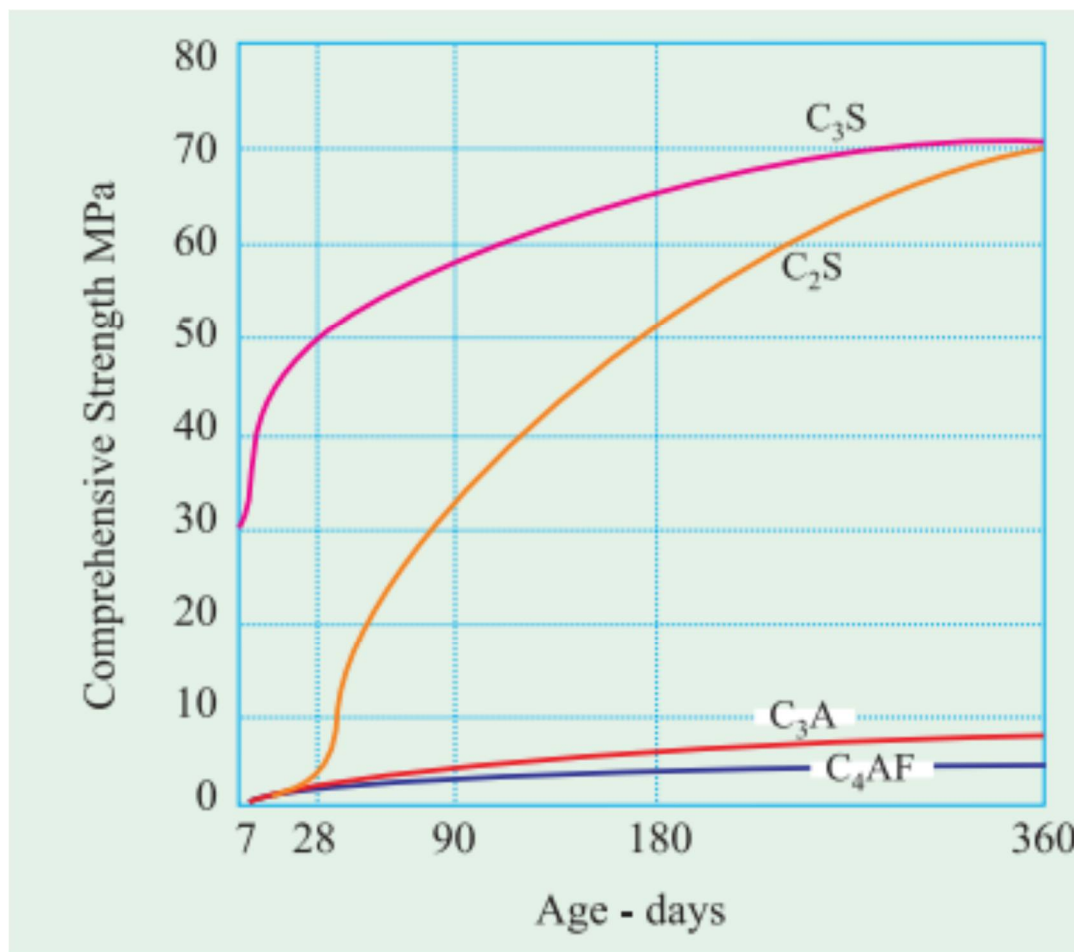
It is a rapid development of rigidity of cement paste without generation of much heat. This rigidity can be overcome & plasticity can be regained by further mixing without addition of water. In this way cement paste restores its plasticity & sets in a normal manner without any loss of strength. It may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

 END

**QUESTION:-2 DRAW A GRAPH SHOWING THE STRENGTH DEVELOPMENT OF PURE COMPOUNDS OF CEMENT.**

**Answer:-**

**STRENGTH DEVELOPMENT OF PURE COMPOUNDS OF CEMENT.**



END

**QUESTION:-3 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.**

**Answer:-**

<b>ASTM Type</b>	<b>Classification</b>	<b>Characteristics</b>	<b>Applications</b>
<b>Type III</b>	High early strength (Rapid-hardening)	Ground more finely, may have slightly more $C_3S$	Rapid construction, cold weather concreting
<b>Type IV</b>	Low heat of hydration (slow reacting)	Low content of $C_3S$ (<50%) and $C_3A$	Massive structures such as dams. Now rare.

 END

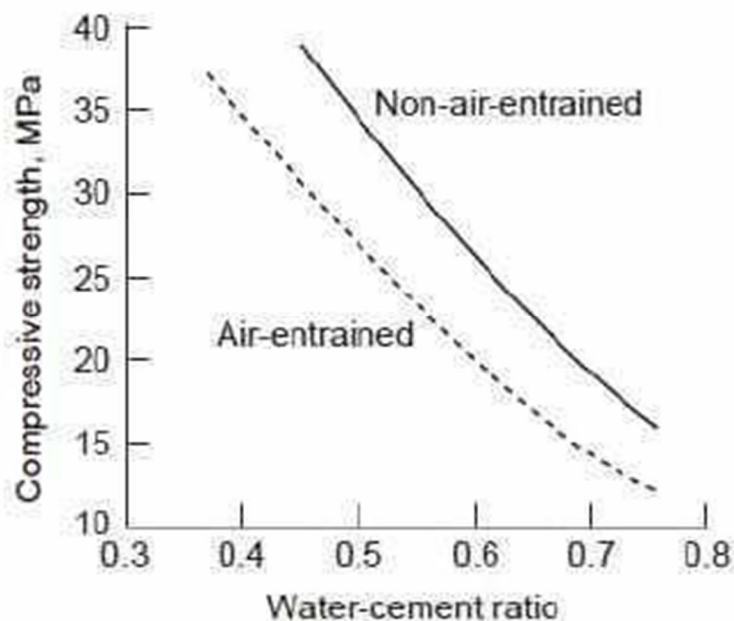
**QUESTION:-4 WHAT IS THE EFFECT OF COMPACTION ON ENTRAPPED AIR OF CONCRETE? WHAT WILL BE THE EFFECT ON STRENGTH IF CONCRETE IS NOT COMPACTED SUFFICIENTLY? EXPLAIN WITH GRAPH**

**Answer:-**

Air entraining admixture is usually introduced when it is desired to increase concrete workability without affecting much reduction in compressive strength.

It is claimed that, the place-ability of an air entrained concrete having 7.5 cm slump is better than a non-air entrained concrete with a slump of 12.5 cm.

By and large, the compressive strength of concrete is reduced by use of air entrained admixture, as shown in Fig. 1. The amount of reduction in strength depends on many factors such as mix proportions, type and grading of concrete, cement and actual air-entraining agent.



**END**

**QUASTION:-5 WHY IS THE PERCENTAGE OF GYPSUM ADDED TO CEMENT LIMITED ONLY TO 5%**

**Answer:-**

Gypsum is a mineral and is hydrated calcium sulfate in chemical form. Gypsum plays a very important role in controlling the rate of hardening of the cement. During the cement manufacturing process, upon the cooling of clinker, a small amount of gypsum is introduced during the final grinding process.

 END

**QUASTION:-6 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**

Answer:-

**i. Shape of aggregate**

The shapes of the aggregate affect the strength of the concrete indirectly. If flaky or angular coarse aggregate is used, it will adversely affect workability.

**ii. Size of aggregate**

The tensile strength of the concrete is severely affected by increasing the size of the aggregate.. There is also a reduction in the elongation limit.

**iii. Texture of aggregate**

The shape and texture of aggregate affects the properties of fresh concrete . A smooth surface can improve workability, yet a rougher surface generates 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., decreases strength, wear resistance and bond strength and causes poor bonds between successive lifts

**QUESTION:-7 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**

**Answer:-**

**i. POROSITY AND ABSORPTION**

- ▶Some of the aggregates 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 water absorption of aggregate is determined by measuring the increase in weight of an oven dry sample when immersed in water for 24 hours.
- ▶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 admixtures cause small stable bubbles of air to form uniformly through a concrete mix. The bubbles are mostly below 1 mm diameter with a high proportion below 0.3 mm. ... Air entrainment reduces the density of the mix and increases yield. This needs to be taken into account when batching and mixing

**iii. COARSE AGGREGATE TO FINE AGGREGATE RATIO**

There is an optimum coarse to fine aggregate ratio for RCCP. Increasing cement from 9% to 12% has significant effect on the properties of RCCP. Coarse to fine aggregate ratio influences the porosity of RCCP. Relationship between tensile strengths and compressive strength were determined.

**iv. GRADING OF AGGREGATE**



Aggregates in concrete are of various uses, this particle size distribution in concrete is termed as "Gradation"

The particle size distribution is determined by sieve analysis

Proper gradation is one of the most important factors in producing workable concrete.

 END

**QUASTION:-8 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**

**Answer:-**

- i. STRENGTH OF CONCRETE**

The strength can be defined as the ability to resist force.

- ii. RATE OF HEAT EVOLUTION DURING HYDRATION**

Heat of hydration and rate of heat evolution of cement samples at different periods.

The rate at which the compressive strength increases strength.

- iii. TOTAL HEAT OF HYDRATION**

The reaction of cement with water is exothermic .The reaction results in the release of considerable amount of heat known as total heat of hydration

- iv. WORKABILITY OF CONCRETE**

Concrete is said to be workable when it is easily placed and compacted.

 **END**

**QUASTION:-9 WHAT STEPS CAN BE TAKEN DURING TRANSPORTATION AND PLACEMENT OF CONCRETE TO PREVENT SEGREGATION OF CONCRETE.**

**Answer:-**

**TRANSPORTATION AND PLACEMENT OF CONCRETE TO PREVENT SEGREGATION OF CONCRETE.**

After mixing, concrete should be transported and placed at site as quickly as possible without segregation, drying, etc. Hence transportation of fresh concrete is very important operation. Depending upon the type of work and equipment available various methods of transporting of concrete can be employed. The method selected should be suitable for use with the consistency of concrete employed.

It is important that the concrete be handled without segregation of the constituent materials. This condition may easily occur if special attention is not given to its prevention. Segregation occurs because concrete is not a homogenous combination, but a mixture of materials differing in size and specific gravity. Thus as soon as the concrete is discharged from the mixer, internal as well as external forces start acting to separate the dissimilar constituents. If over wet concrete is confined in restricting forms, the coarser and heavier particles tend to settle and finer and lighter materials tend to rise

 END