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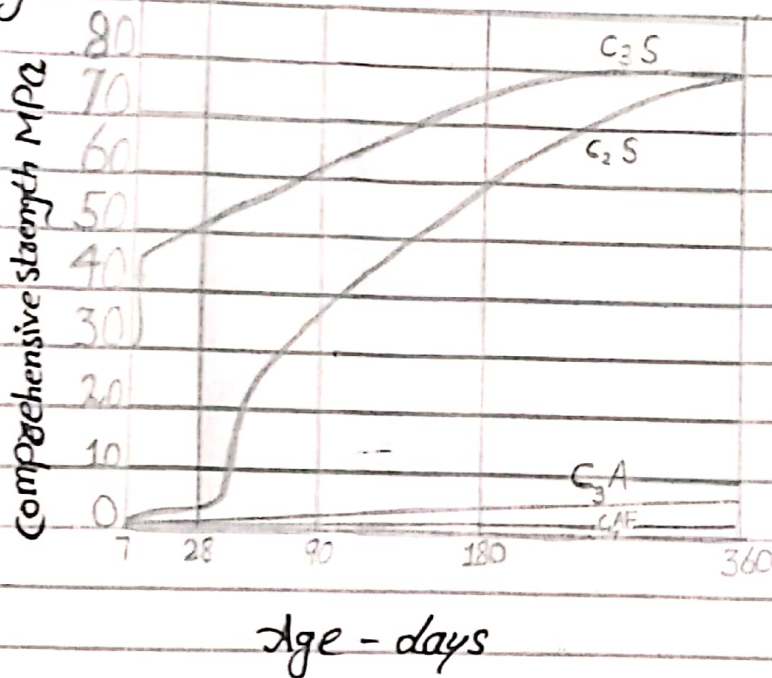
Date : 15-4-2020

Paper : CONCRETE TECHNOLOGY

QNO: 2

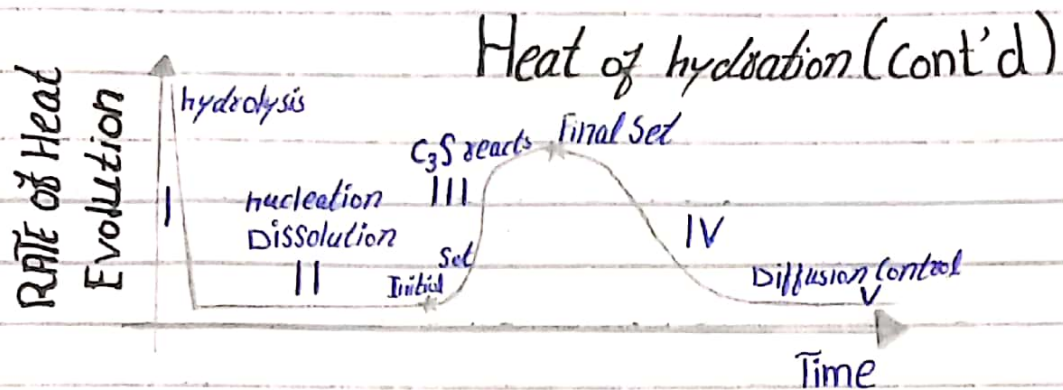
ANS: 2

Diagram



QNO: 3

ANO: 3



Stage I	Rapid heat Evolution	(<15mins)
Stage II	Dormant period	Important for transportation (2-4 hrs)
Stage III	Accelerating stage	Begins with initial set (4-8 hrs)
Stage IV	Deceleration stage	No longer workable (12-24 hrs)
Stage V	Steady state	

- ▶ The reaction of cement with water is exothermic
- ▶ Minimum water requirement for complete hydration is 38% by weight.

◦ Type III Cement:-

Type III cement is rapid hardening because the component of type III is more finely grounded with smaller & granules & addition of more C3A as compared to type IV.

◦ Type IV cement:-

The low heat producing of type IV is due to the low content of C3A & C3S. The product of type IV are less finely grounded therefore the content react slowly & produce low heat of hydration.

QNO: 4

ANS: 4

COMPACTION:

Is the process which expels entrapped air from freshly placed concrete & packs the aggregate particles together so as to increase the density of concrete. For example, the strength of concrete containing 10% of entrapped air [air voids] may be as little as 50% that of the concrete when fully compacted.

Permeability may be similarly affected since compaction, in addition to expelling entrapped air, promotes a more even distribution of pores within the concrete, causing them to become discontinuous. This reduces the permeability of the concrete & hence improves its durability.

QNO: 5

ANS: 5

Gypsum is called the retarding agent of the cement which is mainly used for regulating the setting time of cement. Therefore the gypsum content in a cement is 3-5%. otherwise excess of gypsum also leads to expansion.

QNO: 6

ANS: 6

i Shape of aggregate:

The shape of aggregate affects the properties of fresh concrete is more than hardened concrete. Concrete is more workable when smooth & rounded aggregate is used instead of rough angular or elongated aggregate.

ii Size of aggregate:

When the particles are of uniform size the spacing is the greatest, but when a range of size is used the void spaces are filled & the paste requirement is lowered. The more these voids are filled, the less workable the concrete becomes, therefore, a compromise between workability & economy is necessary.

iii Texture of aggregate:

Texture also affects the concrete. The surface texture of aggregate can be either smooth or rough. A smooth surface can improve workability, yet a rougher surface generates a stronger bond between the paste & the aggregate creating a higher strength.

iv Bleeding:

- Due to bleeding concrete loses its homogeneity.
- Bleeding is responsible for causing permeability in concrete.
- Due to bleeding pumping ability of concrete is reduced.
- Increase in the water-cement ratio at the top.
- The accumulation of water at the top, results in delayed surface finishing.

QNO: 8

ANO: 8

i Strength of Concrete:

More the fineness of cement is more rapid is the development of strength of concrete

ii Rate of heat evolution During hydration:

The finer the cement particles & the greater its surface area, the faster is the rate of hydration & the greater is the proportion of the cement which reacts with in the paste.

iii Total heat of hydration:

The rate of heat generation increases as cement fineness increase & result indicate that increases of cement fineness has no affect on total heat of hydration at 7 days.

iv Workability of Concrete:

The presence of sand fines in concrete is likely to affect the workability, strength & long-term performance of concrete. That is fine particles such as clay & cement interact with water in a physiochemical state which leads to more absorption of water than that of fine & coarse aggregates.

- ▶ Light weight aggregate tends to lower workability.
- ▶ A high volume of coarse aggregate to fine aggregate can result in segregation & lower workability.
- ▶ Fineness of cement also increases the water demand.

Q NO: 9

Ans: 9

- Segregation makes the concrete, weaker, less durable, & will leave poor surface finish.
- 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 increases workability & decreases segregation & bleeding.
- Concrete should not be allowed to fall from greater heights. It should be placed as near its final position as possible.

Q NO: 7

Ans: 7

POROSITY & ABSORPTION

- ▶ Some of the aggregates are porous & absorptive. Porosity & absorption of aggregates will affect the water/cement ratio & hence the workability of concrete as well as the bond between it & cement paste.
- ▶ The porosity of normal rocks vary from 0 to 50%.
- ▶ The ratio of the increase in ~~water~~ weight to the weight of the dry sample expressed as percentage is known as absorption of aggregate.

AIR ENTRAINING AGENT:

The purpose of adding air entrainment in concrete is to protect it from cracks due to freezing & thawing cycles. Compressive strength of concrete is inversely proportional to the workability of concrete. When workability of concrete increases, its compressive strength decreases.

- 1 Effect of air entrainment on concrete compressive strength
- 2 Effect of air entrainment on flexural strength concrete.

COURSE AGGREGATE TO FINE AGGREGATE RATIO

The test results demonstrate that increased the C/F ratio from 0.6 to 1.8 increasing the vebe time three fold, while increased the cement content from 9% to 12% decreased the vebe time by 12%. In addition, increasing the C/F ratio from 0.6 to 1.2 significantly decreased the porosity of RCCP, to about 60% for RCCP with 9% cement & 38% for RCCP with 12% cement.

Generally, the most suitable C/F ratio for RCCP appeared to be from 1.2 to 1.4. Thus, to attain a workable, high-strength & durable RCCP, a mix with 12% cement & 1.2 C/F ratio is recommended.

GRADING OF AGGREGATE:

This is one of the factors which will have maximum influence on workability. A well graded aggregate is the one which has least amount of voids in a given volume. With excess amount of paste, the mixture becomes cohesive & fatty which prevents segregation of particles.

QNO : 1

ANNO : 1

FLASH SETTING :-

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 C_3A with water.

STEP TO PREVENT FLASH SETTING :-

=> Gypsum is added in the cement to prevent flash setting.

FALSE SETTING :-

False set is the rapid development of rigidity in freshly mixed portland cement paste, mortar, or concrete without the generation of much heat. False set occurs because some of the gypsum dehydrates as a result of contacting hot clinker or high temperatures in the grinding mill. This leads to stiffening due to the rapid reformation of secondary gypsum with interlocking needle-like crystals. Additional mixing without added water breaks up these crystals to restore workability. Ettringite precipitation can also contribute to false set.

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THE END