This is very much applicable in the construction process. By determining this value, it is understandable how much watere is to be mixed with cement to get the desired concrete. It is useful to determine the w/c ratio and normal consistancy of the cement in desired concrete in case of construction process.

Q1 Why cone test is done for fine aggregate? Briefly discuss the process?

Answer:

To achive the SSD condition of the aggregate the cone test is done for the fine aggregates are very fine particles. In this test, the cone is placed with the large diameter down on a glass plate and is filled over-flowing with dry sand. Then the aggregate is slightly tamped with 25 light drops of tamperes. Each drop should start about 1/5 inch above the top surface. If surface moisture is still present, the fine aggregate will retain in the molded shape. When the sand achive an SSD condition, the sand will slump.

The value of ASG (O-D) will be greater ... equation it is seen that value of specific gravity is the ratio of wt of aggregate and wt of water occupying permeable pore. In case of ASG (O-D) wt of water which occupies equal volume excluding permeable pore is needed. As in this case, the water which is inside permeable pores is avoided. So this wt of water will be lower than that of SSD and BSG (O-D). As a result, the value of specific gravity will be higher in case of ASG (O-D).

21 What is effective absorption capacity of aggregate (SSD basis)? What is it's use?

Answer:

~~Iffe~~ Effective apsorption capacity in SSD condition means what percentage (amount) of water presents in the pores of the aggregate particle to it's total weight.

$$\text{Percentage of effective absorption SSD basis} = \frac{\text{SSD wt} - \text{Airdry wt.}}{\text{Sample wt (SSD)}} \times 100\%$$

$$= \frac{S - H}{S} \times 100\%$$

Assignment Questions:

1] How bulk specific gravity (O-D), bulk specific gravity (SSD) and apparent specific gravity (OD) can be corrected? Which one is greatere and why?

Answere:

Bulk specific gravity (O-D), bulk specific gravity (SSD) and apparent specific gravity all are the ratio of wt of aggregate and watere in the aggregates wt. This value of specific gravity in all cases gives the porosity of the aggregates particles. The differenee is that in each case wt of aggregates and volume of watere which wt need to be calculated is determined in different condition. Actually,

$$BSG\ (O\text{-}D) = \frac{\text{Oven dry wt of aggregate}}{\text{wt of watere occupying in equal volume including permeable pores.}}$$

$$BSG\ (SSD) = \frac{\text{SSD wt of aggregates}}{\text{wt of watere occupying equal volume including permeable pore}}$$

$$ASG\ (OD) = \frac{\text{Oven dry wt of aggregate}}{\text{wt of watere occupying equal volume excluding permeable pore.}}$$

Materials used:

- Coarse aggregate
- Fine aggregate
- Water

Apparatus used:

- Balance
- Pycnometer
- Mold
- Tamper
- Sample containers
- Sieves
- Water tank

Objective:

The objective of this experiment is to determine specific gravity and absorption of fine and coarse aggregate.

Scope:

The measured water absorption rate and specific gravity of aggregate is routinely used design and construction of pavement materials and structure. With the specific gravity of each constituent known, its weight can be converted into solid volume and hence a theoretical yield of concrete per unit volume can be calculated. This specific gravity is also used in calculating the percentage of voids and the solid volume of aggregates in computation of yield, knowing the specific gravity of aggregates is also critical to the construction of water filtration systems, slope stablization projects, railway bedding, calculating the compacting factor. The absorption is important in determining the net water-cement ratio in concrete mix.

In a gradation curve, value of sieve opening size is put on 'x' axis and percentage finer by weight or percentage retained on the sieve is put on 'Y' axis. From this curve we can find how much percentage retained on each sieve and we can sum the values and devide it by 100 and there we can find the fineness modulus of that aggregate sample.

strength of that concrete will be high as there is lack of porosity in the concrete. Gap grading is a kind of grading which lacks one or more intermediate size and there will be some porus. On the other hand, uniformly graded and open graded aggregates has more porus and if we produce concrete with these types of aggregate, then there will be pore and it will decrease the compressive strength of the concrete.

2. Fineness modulus of the aggregate sample can be calculated by using the gradiation curve - explain

Answer: We know that, the fineness modulus is an empericeal factore obtained by adding the cumulative percentage of aggregates retained on each of the ASIM standard sieves and dividing this sum arbitary by 100.

$$FM = \frac{\Sigma \text{cumulative \% retained on the standared sieves up to no. 100}}{}$$

Assignment Questions and Answers

1. How aggregate gradiation can affect the compressive strength of concrete?

Answer: We can know that there are five different kinds of distribution in aggregate gradiation. They are -

i) dense graded
ii) gap graded
iii) Uniformly graded
iv) Well graded
v) Open graded

Each gradiation or distribution types plays on important role in determining the compressive strength of the concrete. Dense and well-graded aggregates are desirable fore making concrete, as the space between largere particles is effectively filled by smallere particles to produce a well packed structure and fore this compressive

particles and a dense graded aggregate would be needed. From sieve analysis we can find the fineness modulus of the aggregate which is an empirical factore obtained by adding the cumulative percentage of aggregates retained on each of the ASTM standard sieves and diving this sum arbitarcity by 100.

So, from this test we can get fineness modulus

Objective:

The objective of this experiment is

Scope of the test:

The sieve analysis commonly known as the gradiation test determines the distribution of aggregate particles, by size, within a given sample in ordere to determine compliance with design, production control requirements and verification specifications. It is a very good quality control and quality acceptance tool.

Gradiation is usually specified fore each engineering application it is used fore. Fore example:

Open graded bases are preferred because of the storage and treatment benifits. Gradation is primarily a concern in pavement mix design. Concrete could call fore both coarse and fine

From whole lot, we chose the breicks whose characteristics are common in them. We don't choose any unique one from them. Fore testing, the sample should be almost same in colore, testing and size. Representative samples are selected from lot which show avarage characteristics. So that while getting result, the variation must be not exceed the limit and we will get proper result.

3. What are the possible effects of efflorence in construction? How it can be controlled?

Ans: There are some effects of efflorescence in construction.

i) Dampness: As salt dissolves in watere easily, the drey watere fore efflorescence will become dampy, wet.

ii) Colore: Fore efflorescence, on the surface

These are some basic criteria of a capping material. The strength of the capping material must be greatere than brick itself. Because, while testing compressive strength, if capping material's strength is less than brick, then the failure load of capping material will be obtained, not of brick.

2. What is representative sample? How representative samples of brick are selected from a lot?

Ans: While choosing sample fore this test, there is a lot of bricks. From each lot of 1,000,000 bricks, ten bricks are selected. These samples are called representative sample.

Representative samples of brick are selected from a lot by investigating basically three characteristics.

1. Color 2. Texture 3. Size.

criteria of a capping material?

Ans: Capping is needed for various purpose. Some are given below:

i) The surface that will be exposed in compressive strength test must be uniform. Because strength is measured by load per unit area. If the exposed surface has any deformation, then we will not uniform surface. Actual strength will not be found as a result.

ii) If capping is not done, then, using bricks in walls will not be easy. Because bricks have to be placed one after another. If capping is not done, then for the depression, hollow will be created.

Basic criteria of a capping material -

Result:

The avarage crushing strength of the sample brick is . The avarage absorption capacity was 20·96%

Discussion:

(I) Efflorescense was seen in all the sample brick which is not good quality of the sample bricks. Excessive efflorescence can cause expansion that may disrupt the surface.

(II) According to the ASTM specification C67, the compressive strength of 1st class bricks should not be less than 2500 psi. In the experiment, the avarage compressive strength of the sample bricks was 5820 psi which satisfies the required.

Source: ASTM specificati C67

(III) According to the ASTM specification C67, bricks should not absorb more than $\frac{1}{6}$th of their own weight of water. But in our experiment, the avarage absorption capacity was 20·96% which was more than $\frac{1}{6}$th of their own weight of water. This behaviour of bricks is not accepted as excessive will creat void and affects the strength and durability.

Apparatus :

1. Capping mold.
2. Testing machine.
3. Trays and Containers.

Objective:

The objective of the experiment is to test and sample of bricks fore compressive strength, efflorescence and absorption.

Scope of the test:

Brick is an important structure element which is used in brick flat soling, masonry walls, sometimes in load bearing wall. Compressive strength of brick helps us to determine how much load brick can carry. By doing efflorescence test, we can know the presence of salt in brick. Efflorescence creats dampness, deforemation of pluster. Efflorescence test is necessary to know the presence of dampness in structure. Again, more absorption of waters of brieks causes large strength decreasing. So, absorption test is also necessary.

Material Used:

1. Cement (Quick hardening cement)
2. Sand.
3. Capping material.

related to watere-cement ratio of concrete?

Answer:: The compressive streength of concrete is related to watere cement ratio of concrete. If the watere-cement ratio is high, the compressive streength of concrete will be decreasing gradually. The reason is that if the amount of watere is high, then all the watere particles will not be able to participate in the hydration reaction with all the cement particles. As a result, there will be a lack of hydration and the compressive streength of the concrete will be low. On the other hand, if the watere-cement ration is low, perfect hydration reaction will occure between the watere and the cement particles. So, in this case the compressive streength of concrete will be highere.

2. Why it is necessary to do slump test? How it

of concrete is one of the most significant property.

Actually, workability means how easily we can handle, mix, use and transport any concrete. It refers to the ability of flowing concrete. In slump test, at first the concrete is placed or filled through a frustum. Then after the frustum has removed, how much displacement of the concrete has occured is measured. This is the slump value. If the concrete is more flowable, then the slump value will be highere. In this case, the concrete will be a preferable workable concrete. If the slump value of concrete is low, the workability of concrete will be also low.

3. Why compressive strength of concrete using cube specimen gives highere value than that from cylindri-

In cube, length is equal to diameter.

So, $\frac{L}{D}$ ratio is 1. On the other hand, in case of cylindrical specimen length is greater than diameter and $\frac{L}{D}$ ratio is greater than 1. As $\frac{L}{D}$ ratio of cube specimen is less than 1.75, we have to correct the strength value by multiplying by the appropriate correction factor. Generally, we get 20-30% more compressive strength in cube than cylindrical specimen.

4. Define combined failure and mortare failure of concrete. Which type of failure is preferable and why?

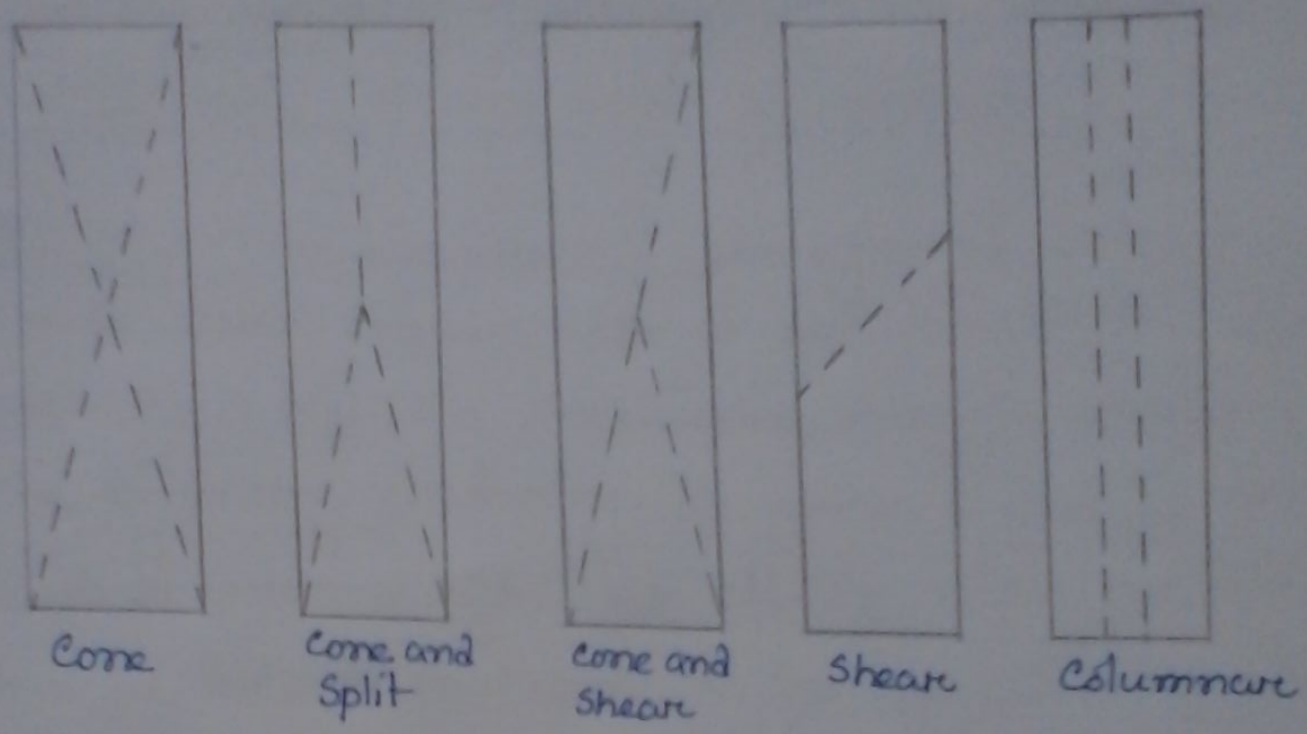
Answer: If the test specimen is loaded beyond it's maximum stress limit, then it breaks through a line. When fine aggregate and coarse and break aggregate remain unchanged this failure of cement is known as mortare failure.

When both coarse and fine aggregate as well as cement particles break through the breaking

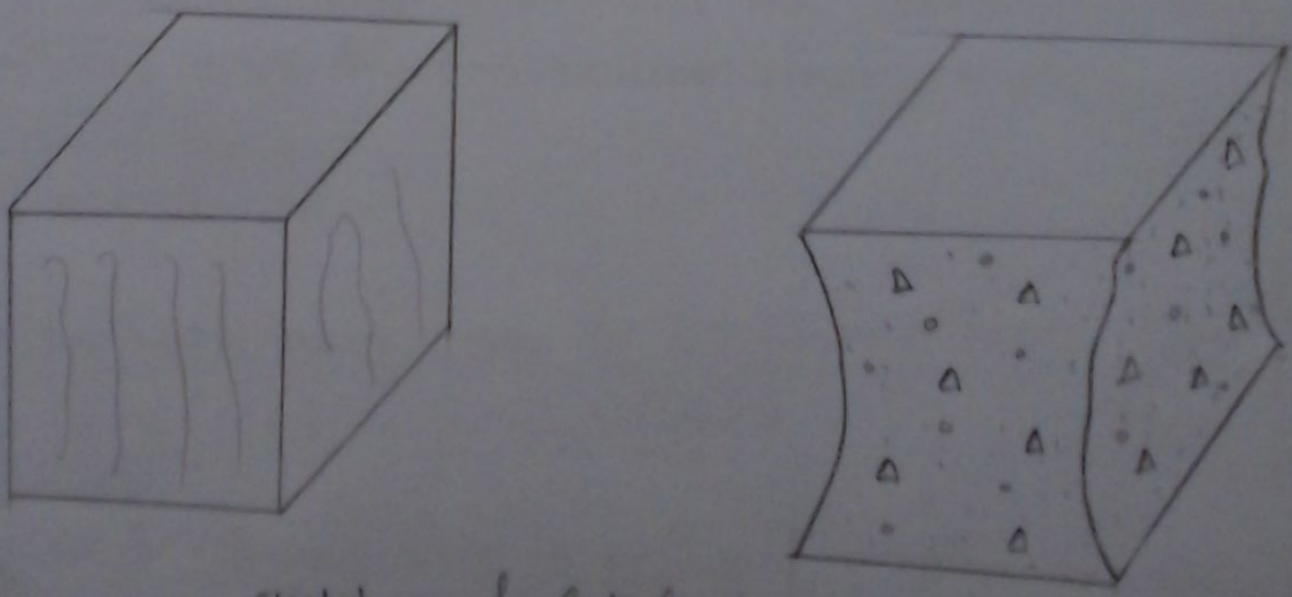
breaking line, this type of failure is known as combined failure.

Combined failure is preferable. Because this type of failure shows that the compaction process is perfect and all ather particles of aggregates along with water have mixed properly. The concrete which shows this combined failure can break all the aggregates and it has capacity to beare the stress uniformly over the total surface. On the ather hand, morctere failure of concrete indicates the poore compaction and unsatisfactory mixing of the aggregate. So, combined failure is preferable.

(v) While crushing cylindrical specimens following fractures are seen:



(vi) While crushing cube specimens, following fractures are seen.



Sketches of Satisfactory types of fracture for cube

Discussion:

(I) The cylindrical concrete specimens tested in accordance to the ASTM specifications c39 and the cube concrete specimens tested accordance to the British standard specification BS1881.

Source: ASTM specification and British standard specification.

(II) From the compressive strength vs w/c ratio curve at different ages fore both cubes and cylinderes, compressive strength decreare with the increare of w/c ratio.

(III) From the compressive strength v/s age curve at different w/c ratio fore both cubes and cylindere, compressive strength increare rapidly. Then the rate of increasing compressive strength becomes slowere gradually

(IV) In case of cube specimens, the compressive strength is reladively lowere than the cylindrical specimens on the surface area of cube is greatere than that of cylindrical specimen.

Apparatus:

1. Cylindrical and cube molds
2. Weighing machine
3. Metal buckets
4. Scoop
5. Compacting bare ore vibreatore
6. Concrete mixturce
7. Slump testing mold
8. Sampling treay
9. Compression testing machine.

Objective:

The objective of the test is to determine the compressive strength of concrete using cylindrical and cube specimens.

Scope of the test:

The experiment gives the value of compressive strength of concrete which is an important parameter of any structure made of concrete. The compressive strength of concrete is the most common performance measure used by the engineers in designing buildings and other structures. Concrete is used as a major element of any structure as it can bear compressive strength which is the most important factor for the existence of the structure

Matericals Used:

1. Coarse aggregate
2. Fine aggregate
3. Cement (PCC - type II)