Proportioning of concrete ingredients and mixes

Design, Architecture

Ingredients for concrete are cement, fine aggregate, coarse aggregate and water. The best concrete can be obtained by mixing the ingredients in correct proportions. The ideal proportion of concrete will be that, which produces greatest strength and solidity at the least cost. In estimating the quantities of ingredients for cement concrete it should keep in mind that voids of coarse aggregates are filled up by sand and voids of fine aggregates are filled up by cement. The concrete mix of 1: 1: 2 and 1: 11/2: 3 are mostly used for water retaining structures.

The concrete mix 1: 2: 4 is most commonly used for R. C. C. construction. The mix proportion of 1: 3: 6 and 1: 4: 8 are used in lean concrete works. The concept behind the proportioning of concrete mixes is that the resulting concrete is densest and strongest with least amount of cement. Following are the methods of proportioning concrete: •Arbitrary Standard Method. The concept of this method is that fine aggregate should be sufficient in the mix to fill the voids of coarse aggregate and quantity of cement is just sufficient to fill the voids of the fine aggregate.

By experiments and experience, it is seen that ratio of fine aggregate and coarse aggregate to develop a dense mix lies between 1: 11/2 and 1: 21/2. Similarly, amount of cement, required to fill the voids of fine aggregate is ascertained. Based on experience and experiments, it is possible to fix arbitrary ratios of cement, F. A. and C. A. in forms of 1: n: 2n. •Minimum Voids Method. In this method of proportioning, the voids in F. A. and C. A. are found out the separately with the help of graduated cylinder and water.

After finding the voids, cement and F. A. are so proportioned that they are slightly more in volume than the voids in F. A. and C. A. , respectively.

Cement is normally taken 10% more and F. A. about 15% more than the percentage of voids in F. A. and C. A. Sufficient water is added to the mix, so obtained to make the mix workable. This method does not give satisfactory results because presence of water, in sand and cement separates the constituents of coarse aggregate, thereby increasing the voids.

In this method of proportioning no consideration is given to the grading of the aggregate which is very important concept in concretetechnology. Hence, concrete designed by this method does not give the highest strength. •W/c Ratio. W/c ratio law states that the strength of well compacted concrete with good workabity is dependent only on w/c ratio. In addition to other factors like grading and proportioning of aggregates, proportion of cement, the workability of concrete also depends upon the quantity of water used in the mixture. ?