Comparative Study of Concrete Mix Design of M-20 Grade

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***Abstract*—** In this paper the study of the mix design based on certain aspects the evaluation has been done such the stipulations for the proportioning. Concrete is the essential structure material used for supporting components like columns, beam. M 20 grade is taken and by varying the water cement ratio the results were obtained by using a module briefly a application in terms of volume proportion ratio and also in terms of weight. All of us wishes to have a well-assembled, strong and excellent home. Guaranteeing the quality of the building is the most basic part among development. The quality of your home relies upon the nature of the concrete, manufacturer progresses for development.

***Key words*—** Concrete, M20 grade, water-cement ratio.

I. INTRODUCTION

A decent concrete mixture configuration makes the establishment of a comprehensive framework. Concrete mix configuration includes a procedure of planning in which a mixture of constituents makes the required quality and strength for the structure. Since each element in the mix comprises of various properties, it is anything but a simple task to make an extraordinary Concrete mix. It is basic that all constituents be tried to decide their physical properties and the bearing limit of the venture area.
The constituents to be tried: water, fine total (sand), coarse total, bond, synthetic mixtures, fortification, and soil. The estimations of the physical properties acquired in the wake of testing will be utilized as the reason for all concrete structure observations. This will guarantee the structure will be sound and forestall disappointment of the mixture. Note that the elements for the mixture may shift starting with one anticipate area then onto the next, so the physical properties must be tried for the necessities determined for every area.

II. EVALUATE THE QUALITY CONCRETE TO ENSURE A STRONG HOME

As we know, concrete is a mixture of bond, water, sand and totals. It is a phenomenal development material having simple mouldability, long sturdiness, and high compressive quality.
Evaluations and sorts of cement, The quality of the concrete is named by evaluation. The evaluation reflects the compressive quality which is the trademark quality of concrete next 28 days. It is described by a letter M pursued by a number. Different levels of cement are utilized for various applications in home developments. Diverse kinds of cement including normal, standard and high quality cement incorporate utilization of different evaluations. Standard cement incorporates evaluations of M10, M15 and M20. The standard ones incorporate M25, M30, M35, M40, M45, M50, and M55. The high quality cement incorporates M60 and M80 grades. The high quality cement has its applications for elevated structures.





The extent of the materials in the concrete mix additionally changes for various applications. For example, an extent of 1:2:4 (1 part of bond, 2 sections of sand, and 4 sections of totals) is utilized for footings of columns and pontoon establishments. Also used in the RCC works such as lintel racks. The amount of water required for this extent per sack of concrete (50 kg) is around 30 liters. Be that as it may, for RCC work in bars, columns, dividers and others, an extent of 1:1.5:3 is utilized which requires around 25 liters of water for every sack of bond. Earth or soil covering on it keeps the attachment of bond. This thusly backs off the setting and hardening process, decreasing the quality of cement. In this way guarantee quality totals are utilized. Great quality totals are thick, dormant, hard and sturdy. They are fit for keeping up well holding with the bond glue. Evaluations of totals are communicated

regarding BIS test no. 480, 240, 120, 60, 30 and 15. Here are a few highlights of value totals that you should check. They ought to be precise however not level, Mud and different contaminations must not be there.
They similarly should not contain signs of layers of some other shading as the parts of cement are mixed by water, it is important to try and utilize great quality water for mixture. It must to be spotless and new. It must to be without earth and undesirable synthetic compounds as they influence the quality of cement.

III.EVALUATING THE NATURE OF CONCRETE

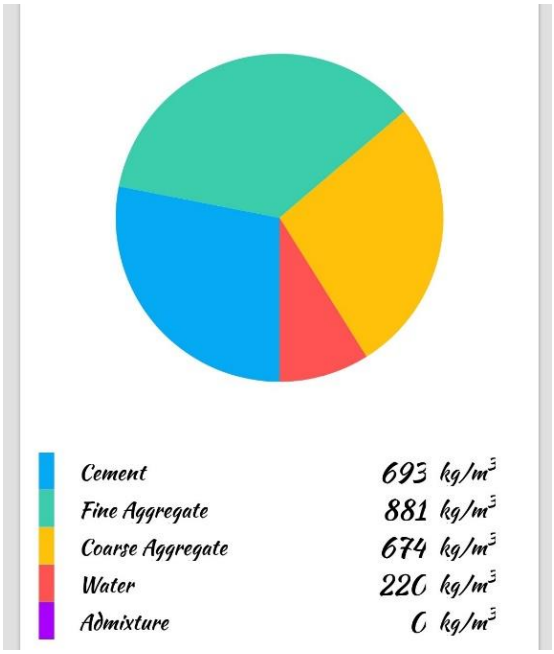
However, it isn't feasible for a typical man to know or check the nature of cement arranged at the building site. Just a development manager can know its quality by certain pressure and sag test techniques. However, nowadays prepared mixture concrete is being utilized for development which decreases the work induce and the odds of mistakes in quality cement. Numerous producers give prepared blend and strengthened bond concrete tried for quality at research facilities and sent to the site.
The Comparative study of concrete with having a standard parameters as constant and varying the slump, water-cement ratio.

Grade of Concrete: M20
Shape of the particle: Angular
Exposure Condition: Mild
Degree of Supervision: Good
Fine aggregate: Zone 1
Size of the coarse aggregate: 20mm
Specific gravity of Fine aggregate = 2.74
Specific gravity of coarse aggregate =2.74
Specific gravity of Cement = 3.15
Water absorption of Fine aggregate = 1%
Water absorption of coarse aggregate = 0.5%

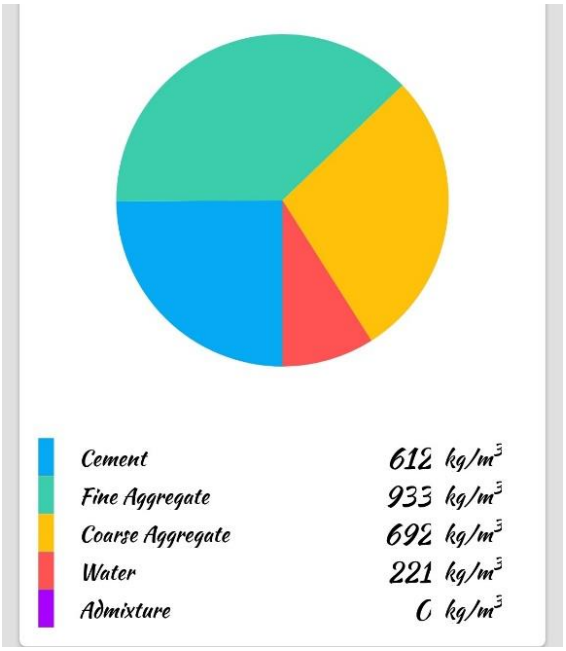
Slump	W/C ratio	Cement: Fine Aggregate: Coarse Aggregate
50	0.30	1:1.48:1.12
	0.34	1:1.77:1.31
	0.38	1:2.07:1.49
	0.42	1:2.38:1.66
	0.46	1:2.70:1.82
	0.50	1:3.02:1.98
75	0.30	1:1.40:1.07
	0.34	1:1.68:1.24
	0.38	1:1.97:1.42
	0.42	1:2.27:1.58
	0.46	1:2.57:1.74
	0.50	1:2.89:1.89
100	0.30	1:1.33:1.01
	0.34	1:1.60:1.18
	0.38	1:1.88:1.35
	0.42	1:2.17:1.51
	0.46	1:2.46:1.66
	0.50	1:2.76:1.81

Weights of each Component present in Concrete mix(Kg/m^3)

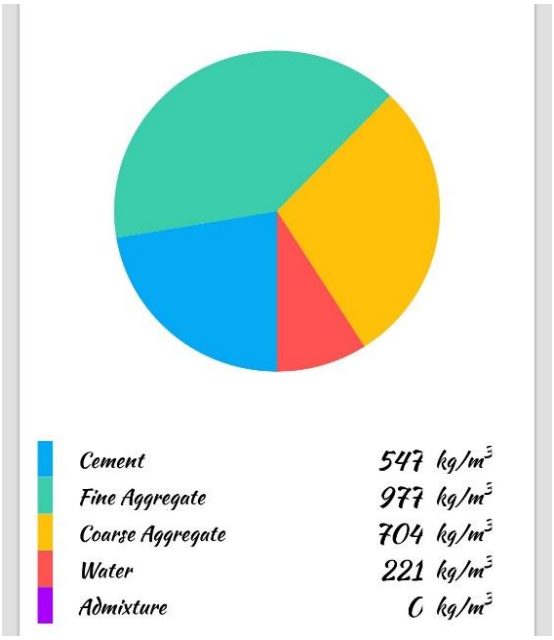
For Slump = 50mm



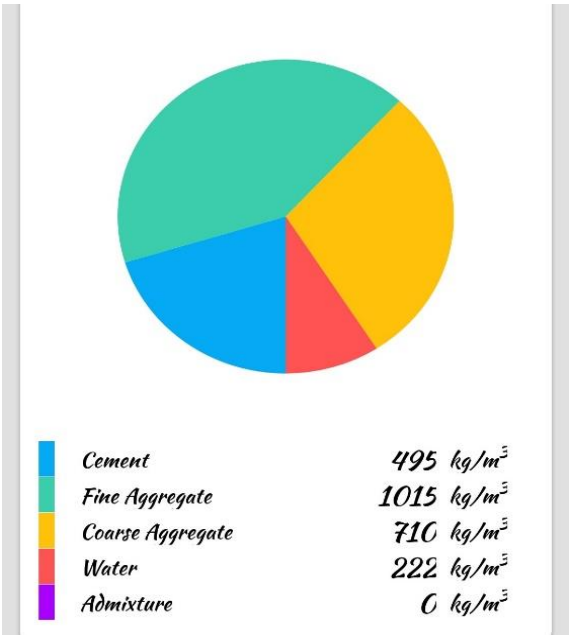
W/C ratio=0.30



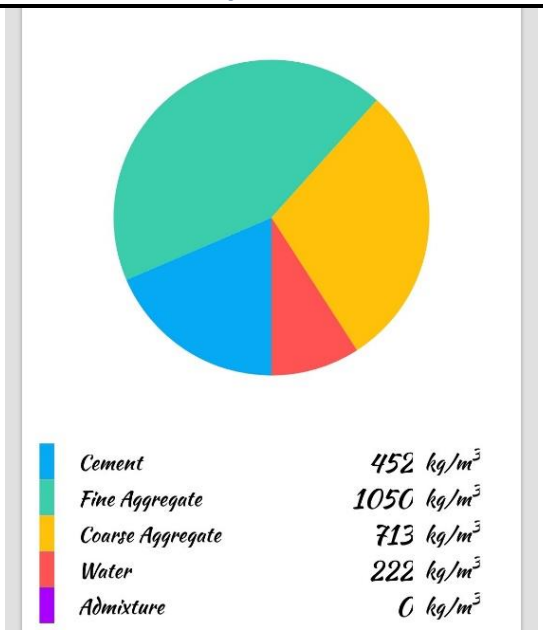
W/C ratio= 0.34



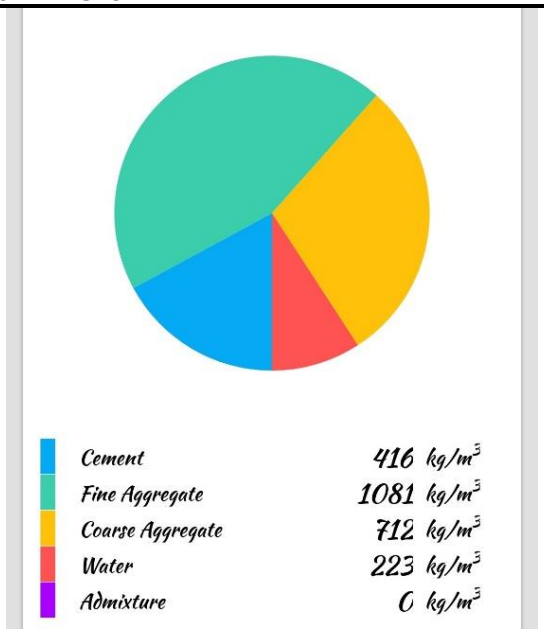
W/C ratio=0.38



W/C ratio = 0.42



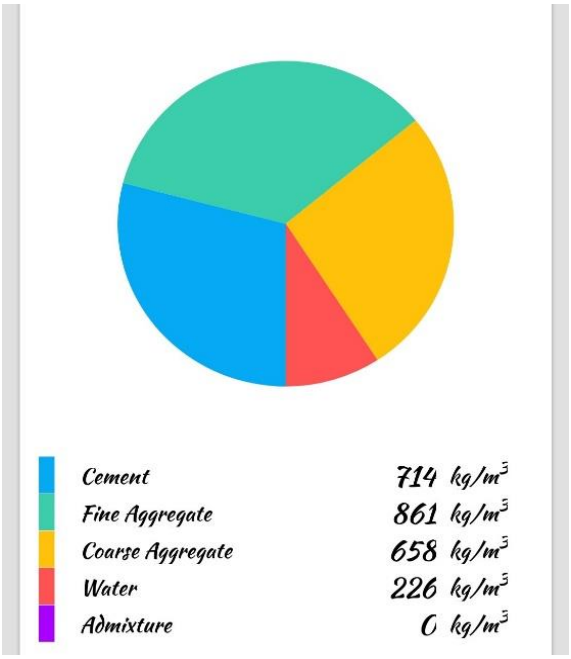
W/C ratio=0.46



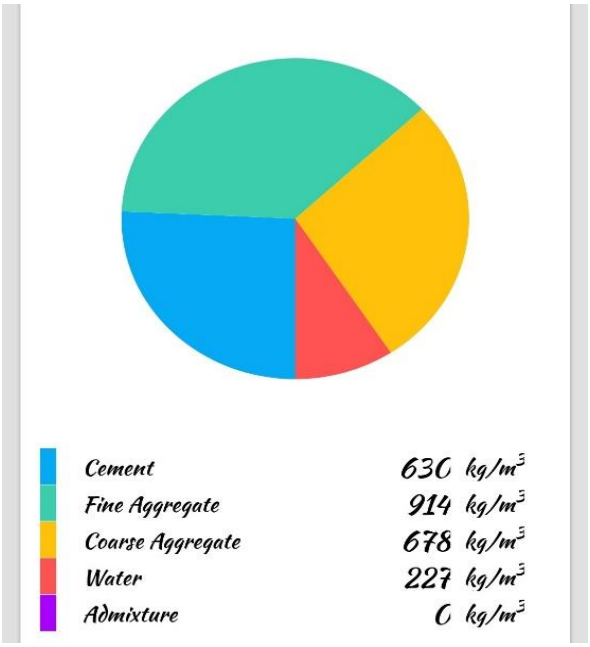
W/C ratio = 0.50

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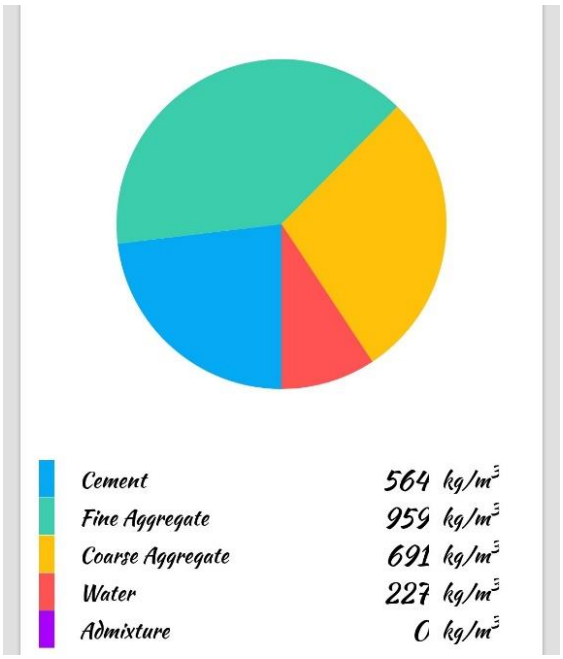
For Slump = 75mm



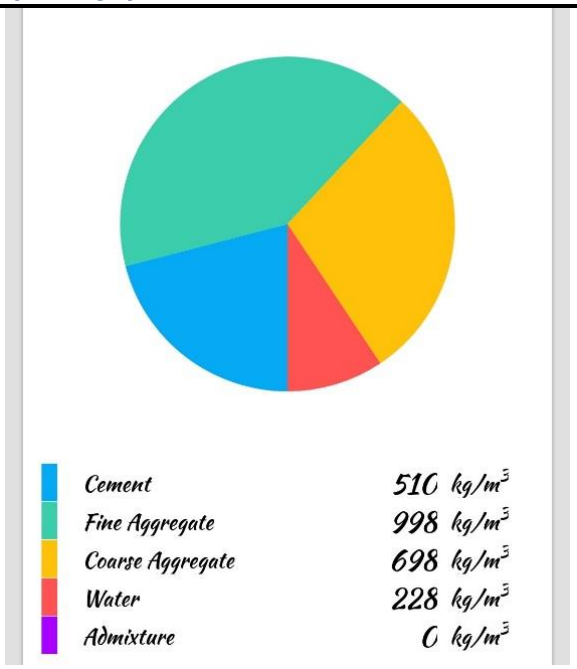
W/C ratio=0.30



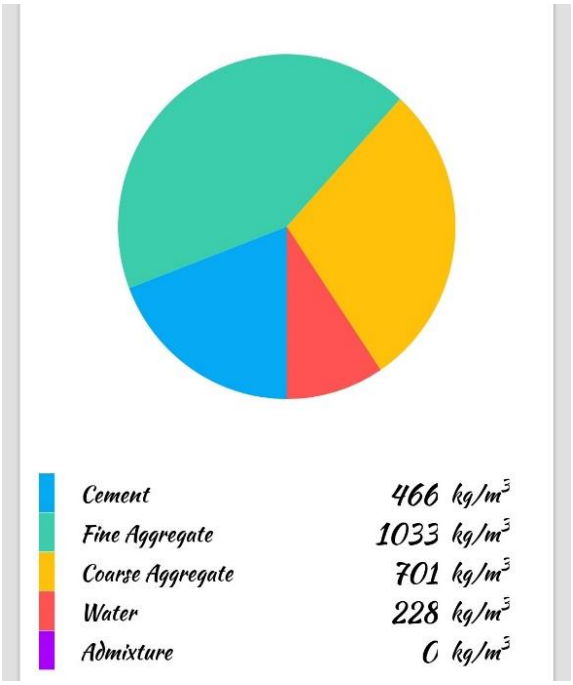
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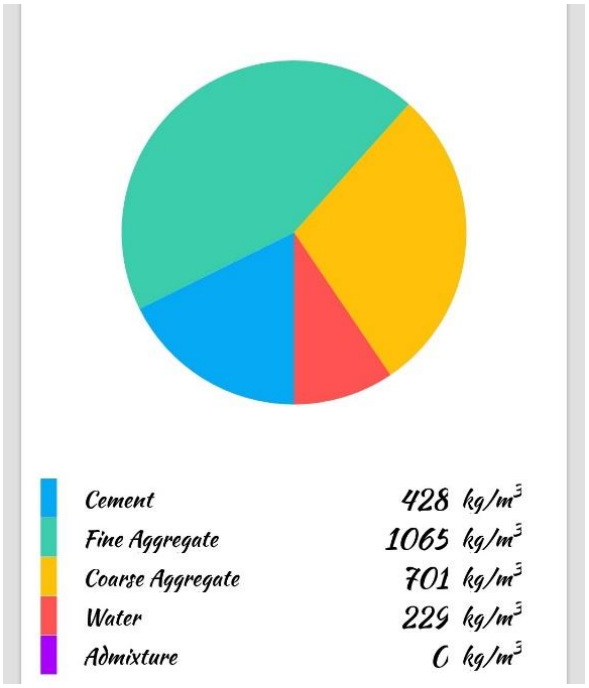
W/C ratio=0.38



W/C ratio = 0.42



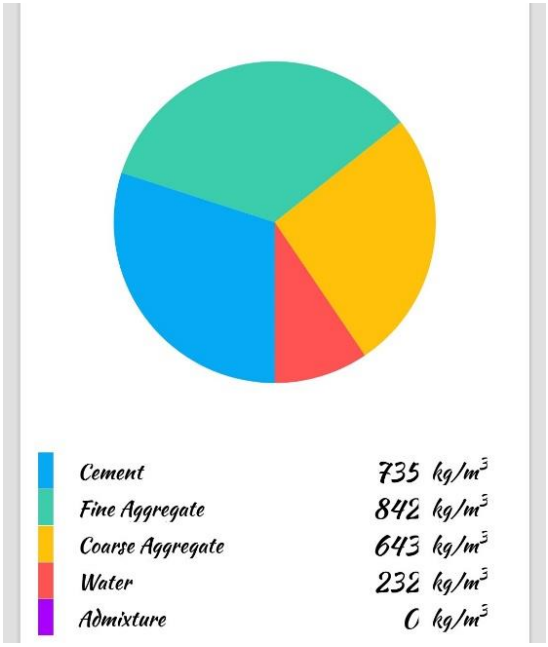
W/C ratio=0.46



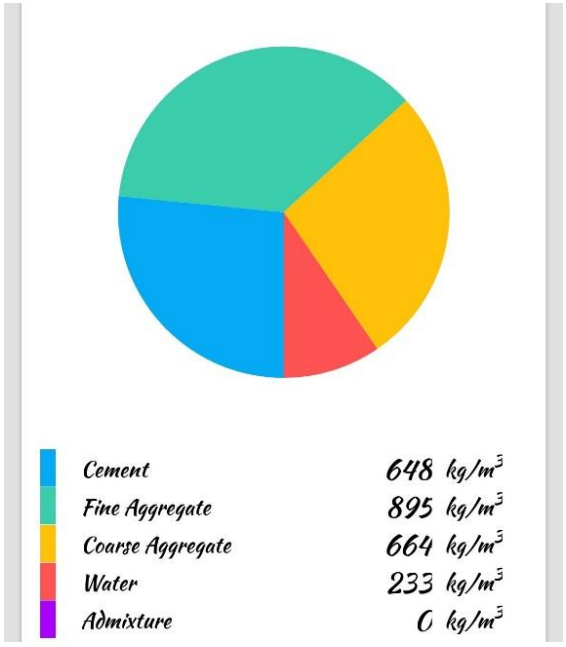
W/C ratio = 0.50

Weights of each Component present in Concrete mix(Kg/m^3)

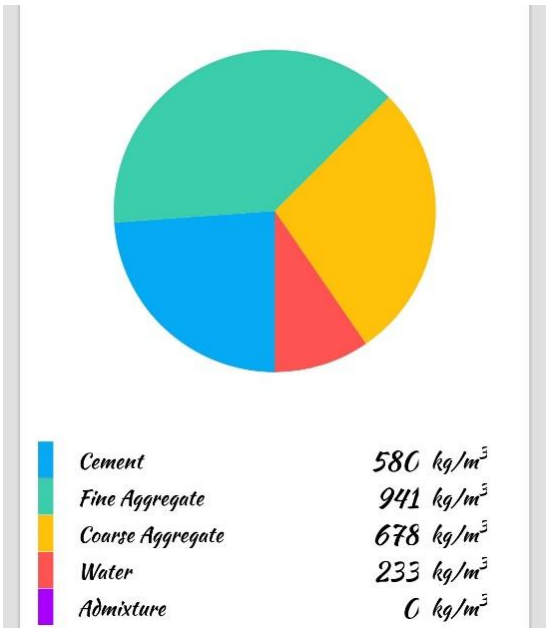
For Slump = 100mm



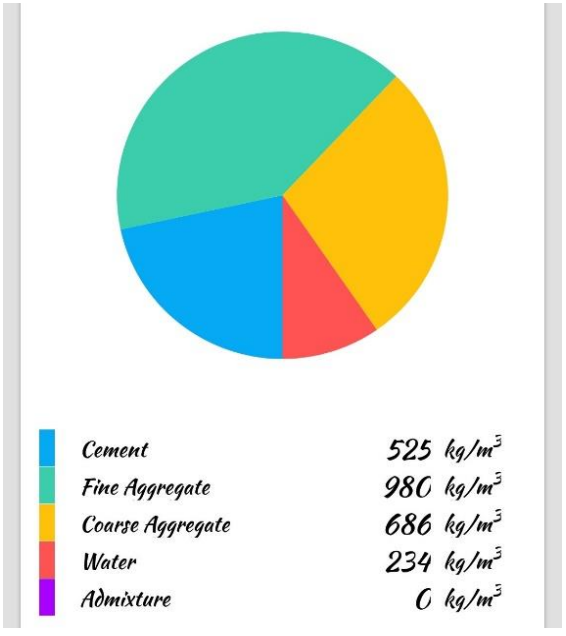
W/C ratio=0.30



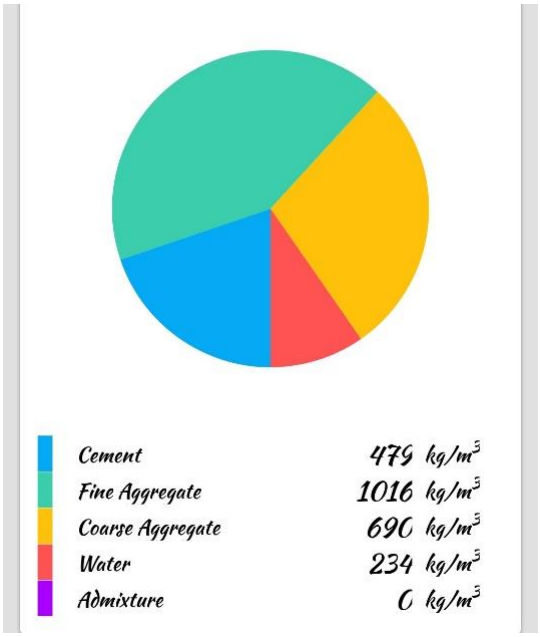
W/C ratio= 0.34



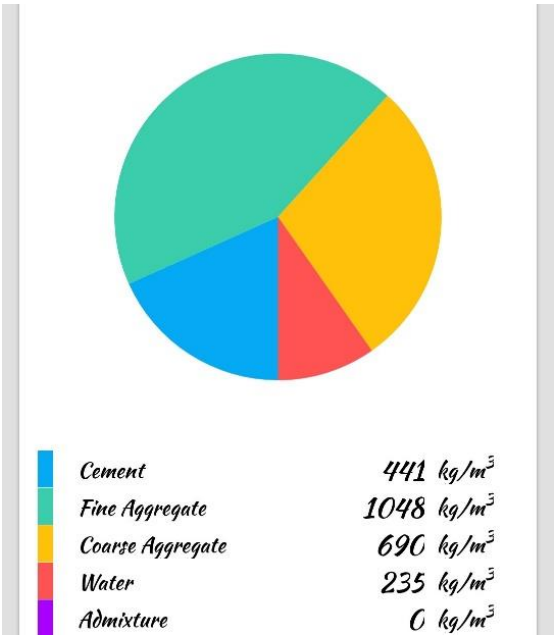
W/C ratio=0.38



W/C ratio = 0.42



W/C ratio=0.46



W/C ratio = 0.50

IV.APPLICATIONS:

1.Domestic floors
2.Foundations (where the weight of structure will be lighter).
3.Workshop bases,
4. Garages,
5.Driveways and
6. Internal floor slabs.

V. CONCLUSION

The water cement ratio plays a very important role in the concrete mix design. The nature of cement additionally relies upon the method for its blending, setting, compacting, completing and restoring. Likewise, it is sufficiently not to utilize quality components; they ought to likewise be included appropriate extents. The water-bond proportion is another factor which influences the quality of cement. It is the proportion of least amount of water to the heaviness of bond required for alluring consistency and usefulness of solid blend. With increment in this proportion, the additional water once vanished abandons little voids. This debilitates the solid thus. In this way, the quality of solid declines with increment in water-concrete proportion.
As the increase in the water-cement ratio with accordance to the slump value the volume has increased in the aggregates both fine and coarse. And also the cement quantity has decreased when the increase in the water-cement ratio.
In this paper the direct solutions for the proportion have been provided by varying the w/c ratio and the slump value this would help you out for the result without huge calculation. And can also be extended by varying the other parameters too.

VI.REFERENCES

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