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Experimental Study of Concrete using Steel Fiber and Ferro-Cement Partial Add of Cement

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Abstract **- It has been Studied that the relative under Compression load partial adding of steel fiber and Ferro-cement appear that the ratio are designed for target strength and result in increased Stress-strain value. For the calculation purpose M25 grade of concrete has been designed on the basis of IS code 10262-2009. The mix design water cement ratio is 0.50. Hence in each batch total no of cylinders come to 5. Out of 3 batches 1st batch was casted with 0 mesh and 0 fiber, 2nd with 0 mesh and 0.5% fiber, 3rd with 1 mesh and 0% fiber. This research has shown that the Steel fiber and Ferro-cement have potential to produce high performance of concrete and it will also improve the characteristic properties.**

Keywords-- **Stress- Strain Curve, steel fiber, Ferro-cement, Grade M25, Compressive strength.**

I. INTRODUCTION

Concrete is a man-made construction materials which is most commonly used in construction work in the world. It is obtained by mixing of water, cement, fine aggregate, coarse aggregate and some minerals admixtures in necessary proportion are known as concrete. The hardened concrete can be worked as an artificial stone in which the voids of coarse are filled by the fine aggregates and cement. The hardening of concrete is caused by chemical reaction between cement, water, and reaction for a long time and hardening of concrete strong with the age[1]. The properties of concrete depend on the quantity and proportion of the ingredients used in the mix and the control exercised in formwork and curing[2].

Concrete is usually in keeping with its compressive strength. the assorted grade of concrete as stipulated in IS: 456:2000[4]. Grade of concrete M5 and M7.5 (1:4:8) square measure used easy for straight forward concerting works like simple foundations footing base, sub structure brick Masonry base, floor base[7]. This concrete is named the lean concrete. For RCC work the grade of concrete ought to be over M15. The grade of concrete M30 isn't used for pre-stressed concrete work. The cement comes in varied varieties and its chemical compositions matters. It provides strength and to increase the binding properties in constructional mass [8].

The combination is meant to form the grade of concrete having needed workability and a characteristic strength not but applicable worth[6]. The target mean strength of concrete combine ought to be capable the characteristic strength and one.65 times the quality deviation The advance leads to the assembly of concrete with the acceptable properties most economically. However, {the combine the combination the combo} style doesn't give as a guide since doesn't assurance the proper mix proportions for the approved performance[9]. These combines square measure known as commonplace mix .IS456:2000 is meant the concrete combine into numbers of grades like, 20,25,30,35 40and forty five. during this designation the latter M denote anti the combination and range is denoted to the minimum compressive strength when twenty eight days solidifying of cubes the unit of compressive strength of concrete in N/mm2[10].

The price of concrete depends on the price of materials that square measure needed for manufacturing a mean strength known as characteristic compressive strength that's mere by the designer[5]. It depends on the standard management live. These combines square measure known as commonplace mix .IS456:2000 is meant the concrete combine into numbers of grades like, 20,25,30,35 40and forty five[3]. during this designation the latter M denote ti the combination and range is denoted to the minimum compressive strength when twenty eight days solidifying of cubes the unit of compressive strength of concrete in N/mm2[3].

II. MATERIALS AND METHODOLOGY

Cement could also be a binding material of constructional mass. Cement like binding material is used in varied sort of construction work like building work and completely different vital structure. By dynamic the fineness of grinding or the substance composition, composition, binding material usually created utterly completely different properties and characteristics. differing kinds of Portland binding material square measure utilized in construction work. Cement used was customary Portland binding material of fifty 3 grade confirming to IS 12269-1987.

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Sand passes through 47.5 mm IS sieve, passed combination is assumed as fine combination. It required to be free from organic matter, durable, hard, chemically inert, clean and free from adherent coating coatings, etc. It mustn't be occurring any huge amount of clay balls or pellets and harmful impure for example alkalis, solid, coal, mica, rock or similar laminated materials etc.

Aggregate was maintained on 4.75 mm of IS sieve and material as is permissible in IS 383 for various size and grading is assumed as coarse combination. Coarse combination of construction material may well be a large sort of coarse materials utilized in construction, furthermore as sand, gravel, crushed stone, slag, recycled concrete. combination the foremost mining materials among the globe.

III. Compressive Strength Of Concrete

The compressive of concrete and mortar is calculation on customary specimens (cube and cylinder) in a very appropriate testing machine. The compressive strength is outline by the last word load divided by the cross sectional space. The compressive strength check is that the commonest employed in concrete cube check, as a result of these check simply complete and therefore the properties of concrete area unit associated with its Compressive Strength. The compressive strength check is allotted on check specimens cylindrical or cube like in form. the form of prism is additionally typically used. however it's not general in our country. the scale of cube specimen is of 150X150X150 mm. Nominal size of the mixture less than 20mm, 10mm size mixture may additionally be used as another. Cylindrical check specimens area unit employed in 150mm in diameter and 300mm long.

Figure 1.1 Compressive Testing Machine

Special step should be taken be for concreting sloping surface, Corners, valleys and corrosion of steel. We are used the vibrating table (IS Code:2514-1963). This vibrating table is used for compaction of concrete mix cube and by vibration table is fixed on rubber mounting spring and the housing of eccentric is fitted below the table top.

The size of table top. The size of table is 1000X1000 mm. It has a heavy vibrator with fixed amplitude and vibrations. Operations. Operates on v 3 phase supply.

Figure 1.2 – Concrete Cubes

IV. Result And Observations

S. No	BATCH 1 (0 FIBER 0 MESH)	
	Stress factor	Strain factor
1	0.00001	0.00076
2	2.0943	0.00164
3	4.2444	0.001968
4	7.0138	0.0021900
5	10.6390	0.003102

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S. No	BATCH 2 (1 FIBER 0 MESH)	
	Stress factor	Stress factor
1	0.04000	0.04000
2	0.56546	0.56546
3	1.754323	1.754323
4	4.0743457	4.0743457
5	6.39478789	6.39478789

S. No	BATCH 3(2 FIBER 0 MESH)	
	Stress factor	Stress factor
1	0.0000	0.0000
2	2.207	2.207
3	2.999	2.999
4	4.074	4.074
5	5.432	5.432

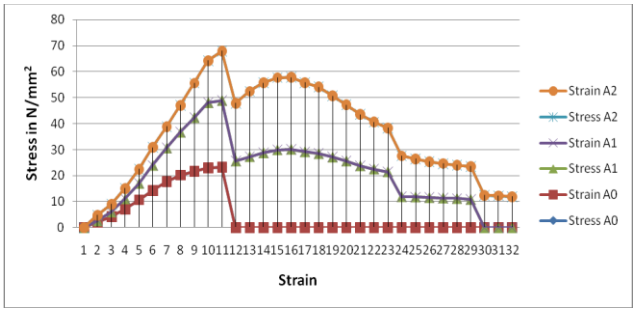

Figure 1.3 comparison between strengths

Behavior of reinforcement concrete –

1. Behavior of A-series Figure 7.1 Comparison between Stress-Strain Curve of concrete having $A_0(0,0)$, $A_1(1,0)$ and $A_2(2,0)$ deferent specimen it is observed that, A_1 (1,0) is covering the maximum stress strain curve followed by $A_2(2,0)$and $A_0(0,0)$.
2. Behavior of B-series It is observed from Figure 7.2 Comparison between Stress-Strain Curve of concrete having $B_0(0,1)$, $B_1(1,1)$ and $B_2(2,1)$ deferent specimen (B Series)that, B_2 (2,1) is covering the maximum stress strain curve followed by $B_0(0,1)$ and $B_1(1,1)$.

V. Conclusion

1. We observed that Figure 7.3 & Figure 7.4 Comparison between Maximum stress-strain curve of concrete having Cylinder Specimen $A_0(0,0)$ and cube Specimen $C_0(0,0)$, Specimen $C_0(0,0)$ strain- strain curve is increase 10% so this is equal to approximately Cylinder Specimen $A_1(1,0)$.
2. We observed that Figure 7.3 Comparison between Maximum Stress-Strain Curve of concrete having$A_0(0,0)$ and $A_1(1,0)$, $A_1(1,0)$ is approximately 10% increase stress but strain is constant.
3. We observed that Figure 7.3 Comparison between Maximum Stress-Strain Curve of concrete having$A_2(2,0)$ and $B_0(0,0.5)$,$B_0(0,0.5)$ is approximately 1% increase stress but strain is constant.

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