INFLUENCE OF M-SAND AND ADDITION OF STEEL FIBER (STRAIGHT) IN SELF COMPACTING CONCRETE

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ABSTRACT
Self-compacting concrete (scc) is flow able, non-segregating concrete that fills uniformly and absolutely each nook of formwork through its own weight and encapsulate reinforcement with none vibration, even as preserving homogeneity. In this the four different types of mixtures conducted with water cement ratio of 0.5. The amount of steel fibre has 0.3%,0.6%,0.9%,1.2% and the steel fiber length has 30mm and 0.5 mm diameter. Nowadays scarcity of river sand adding half amount of m sand. To reduce the workability of concrete the superplasticizer can be added. In this paper the concrete casting by using the cube and fresh concrete test can be done. To identify the concrete strength, the compression strength can be done in 7 days and 28 days in M-20 grade of concrete.

KEY WORDS: Self compacting concrete, Steel fibre, M-Sand

1.INTRODUCTION
The self-compaction concrete is an innovative concrete and it does not require vibration for placing and compaction and it achieves compaction into a formwork under its own weight without any segregation in coarse aggregates. The self-compacting concrete has been grown rapidly due to the shortage of skilled labours and it has been more economical, durable and has a high performance concrete. The SCC can be manufactured by site batching plant or otherwise in ready mix concrete plant deliver by using truck mixer. The concept of SCC develops in japan in 1988 by okamura, and later developed Super Plasticizers is main reason and it made possible to flow and self-consolidate. This paper discusses about the strength of river sand and m-sand in the self-compacting concrete with the addition of steel fiber in concrete.

2.LITERATURE REVIEW:
Kiran. M. Mane, et.al, 2017,has worked on The strength and workability of concrete with manufactured sand. The main part of work has to study the effect of percentage replacement of manufactured sand by natural sand as 0%, 20%, 40%, 60%, 80% and 100% respectively on workability of concrete and the strength characteristics such as compressive strength, shear strength of concrete was carried out. It has M30 grade concrete with 0.45 water cement ratio. It has been observed that any percentage replacement of natural sand to manufactured sand it will reduce workability. The results of in the compressive strength has 60% replacement of natural sand by manufactured sand is found to be 1.52% and shear strength of concrete 60% replacement of natural sand by manufactured sand has21.95%.
StephanAssie,et.al,2006, has Estimates of self-compacting concrete potential durability. IN most of the projects the self-compacting concrete has been used. the rebar has been affected by the corrosion. This project deals about the self-compacting concrete and reference with vibrator concrete according to the French recommendations. To Regardless of a higher Water/Cement proportion (however an equal Water/Binder proportion), SCC has a compressive quality to the VC. SCC and VC has aggressive agents (for example, carbon dioxide and ammonium nitrate) and introduced proportional energy of response.
Mounir M. Kamal et al., 2014 has worked on the “mechanical properties of self-compacted concrete mix”. The Self-Compacting Concrete has increased Quality, durability, Strength. The Paper deals about the contents of Steel fiber and polypropylene fiber in the SCC. The experimental work with Fresh concrete and hardened concrete has been done. The fiber percentage used as 0.75% and 1% percentage has been carried. By addition of fibers it will reduce the bleeding. They several cracks causes the failure in flexure and impact the fibers failed in a ductile manner.

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3. MATERIALS & MIX PROPORTIONS

3.1 MATERIALS

3.1.1 CEMENT

The cement is a fine powder material. It is the most important materials of concrete and it has economical and high quality construction materials used in construction field. The 53 grade of cement used in this project.

3.1.2 RIVER SAND

It may be granular material composed of finely divided rocks and mineral particles. It has been finer than gravel and coarser than silt according to the requirements provided by Indian Standard 383 1970. The 4.25mm sieved sand can be used in the project.

3.1.3 MANUFACTURED SAND (M-SAND)

Due to the scarcity of river sand the m-sand used as the partial replacement of river sand. According to the 4.25mm sieve the m-sand has been used.

3.1.4 COARSE AGGREGATES

It is a medium grained particles used in construction. It has a component of composite materials such as concrete & asphalt according to the requirements of Indian Standard 383 1970. The aggregates size of 20mm has been used in the project.

3.1.5 SUPER PLASTICIZERS

The super plasticizers have high range water reducers. It is main reason for flow ability of self-compacting concrete the super plasticizers have been used in this project TECH-MIX550 has been used.

3.1.6 WATER

The two main function of water in concrete has to react with cement to make set and harden and to link with all other materials and make good flow of concrete. By referring many journals, the water cement ratio has 0.5 percentage has been used.

3.1.7 STEEL FIBRE

In this paper the steel fiber straight has been used. It improves several characterises and properties of the concrete. The addition of steel fiber has been increase the compressive strength of concrete. The steel fibers used in concrete has resists cracking due to plastic and drying shrinkage, it improves durability and fracture parameters of concrete.

3.2 MIX PROPORTIONS

By using the guidelines of EFNARC the mix design concept has been done for M-20 grade of concrete. In this paper the ratio of m 20 has 1:1.697:3.12. In both river sand and m sand the water cement ratio has 0.5% and superplasticizers has 101.5 the mix proportions has been shown in table 3.1

<table>
<thead>
<tr>
<th>% Steel fiber</th>
<th>Cement</th>
<th>R Sand</th>
<th>M Sand</th>
<th>Coarse Aggregates</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3</td>
<td>10.15</td>
<td>17.29</td>
<td>16.54</td>
<td>32.76</td>
</tr>
<tr>
<td>0.6</td>
<td>10.15</td>
<td>17.29</td>
<td>16.54</td>
<td>32.76</td>
</tr>
<tr>
<td>0.9</td>
<td>10.15</td>
<td>17.29</td>
<td>16.54</td>
<td>32.76</td>
</tr>
<tr>
<td>1.2</td>
<td>10.15</td>
<td>17.29</td>
<td>16.54</td>
<td>32.76</td>
</tr>
</tbody>
</table>

Table No 3.1 Mix Proportions for Concrete

4. RESULTS AND METHOD
In fresh concrete tests to check the concrete flow ability and passing ability the fresh concrete tests can be done they fresh concrete tests are J-Ring, V-Funnel, L-Box and U-Box test.

4.1 FRESH CONCRETE TESTS

4.1.1 J-RING TEST
The J-Ring Test can be used to check the Passing ability of fresh concrete. The table 3.1 represents the value of River sand and M-Sand in J-ring test.

<table>
<thead>
<tr>
<th>Steel fibre%</th>
<th>River sand</th>
<th>M-sand</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3</td>
<td>495</td>
<td>480</td>
</tr>
<tr>
<td>0.6</td>
<td>515</td>
<td>500</td>
</tr>
<tr>
<td>0.9</td>
<td>520</td>
<td>510</td>
</tr>
<tr>
<td>1.2</td>
<td>530</td>
<td>525</td>
</tr>
</tbody>
</table>

Table No 4.1 Test Results for J-Ring Test

4.1.2 V-FUNNEL TEST
The test can be used to find the flow ability of the fresh concrete test and it cannot be suitable when aggregate size above 20mm the table 4.2 represents the test results for V-Funnel test.

<table>
<thead>
<tr>
<th>Steel fibre%</th>
<th>River sand</th>
<th>M-sand</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>0.6</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>0.9</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>1.2</td>
<td>11</td>
<td>10</td>
</tr>
</tbody>
</table>

Table No 4.2 Test Results for V-funnel Test

4.1.3 L-BOX TEST:
It is used to find the passing ability and to measure the filling ability of self-compacting concrete the table 4.3 shows the results for l box test.

<table>
<thead>
<tr>
<th>Steel fibre%</th>
<th>River sand</th>
<th>M-Sand</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3</td>
<td>0.81</td>
<td>0.84</td>
</tr>
<tr>
<td>0.6</td>
<td>0.83</td>
<td>0.87</td>
</tr>
<tr>
<td>0.9</td>
<td>0.9</td>
<td>0.93</td>
</tr>
<tr>
<td>1.2</td>
<td>0.95</td>
<td>0.98</td>
</tr>
</tbody>
</table>

Table No 4.3 Test Results for L-Box Test

4.1.4 U-BOX TEST
It is used to find the filling ability of concrete. It has a standard value of 0-30mm. The table 4.4 represents the test results for u-box test.
4.2 Hardened state method

4.2.1 Compressive Strength

The important properties of concrete are compressive strength. The test can be done by using the Indian standards IS: 516-1959. The test results for M sand & river sand are given below.

<table>
<thead>
<tr>
<th>Steel fibre%</th>
<th>River sand</th>
<th>M-sand</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>0.6</td>
<td>18</td>
<td>23</td>
</tr>
<tr>
<td>0.9</td>
<td>23</td>
<td>25</td>
</tr>
<tr>
<td>1.2</td>
<td>27</td>
<td>29</td>
</tr>
</tbody>
</table>

Table No 4.4 Test Results for U-Box Test

CONCLUSIONS:

In this paper study about the half of river sand is replacement by m-sand and by adding the steel fiber in self-compacting concrete has been investigated. The experimental investigation is based on tests of fresh concrete tests and compression test. Hence the following conclusions are derived from this study.

- In this paper the fresh concrete test has been done it has obtained good flow ability and
filling ability of self-compacting in this paper.

- By adding the steel fiber in the self-compacting concrete, it can be avoiding cracks and gives high durability. In compression strength steel fiber percentage of 1.2% in river sand and m-sand has obtained high strength.
- Obtained strength of River sand is higher than the M-sand. But the Strength of M-Sand is higher than the Required level

References


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