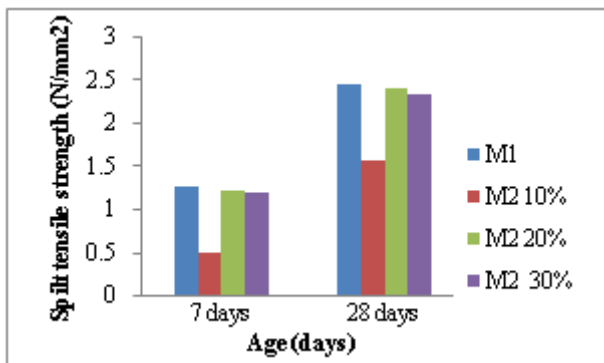






**Table 4:** Spilt tensile strength of partial replacement of fly ash

Age (days)	M <sub>1</sub>	M <sub>2</sub> Replacement (%)		
		10	20	30
7	1.27	0.5	1.22	1.19
28	2.45	1.57	2.41	2.35

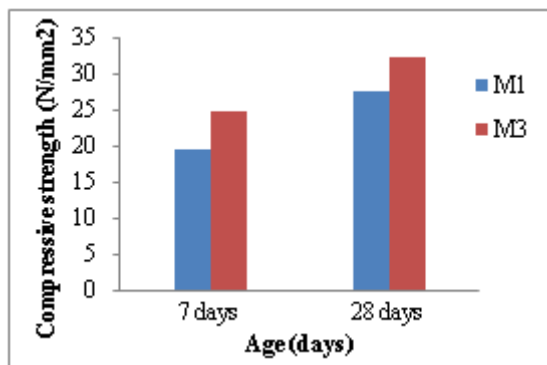


**Figure 2:** Spilt tensile strength of M<sub>1</sub> & M<sub>2</sub>

The above graph, represent the 20% replacement of fly ash by weight of cement is optimized

**Table 5:** Compressive strength of M<sub>1</sub> + M<sub>3</sub>

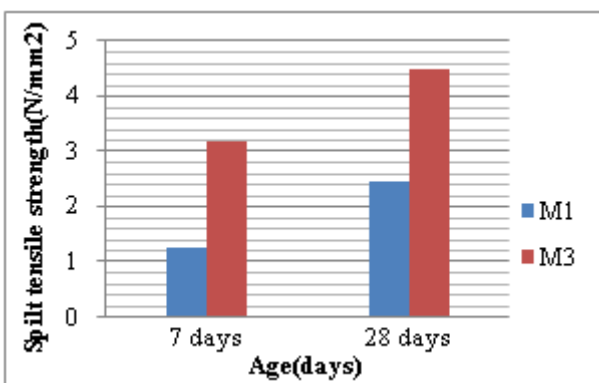
Age (days)	M <sub>1</sub>	M <sub>3</sub>
7	19.56	24.85
28	27.65	32.57



**Figure 3:** Compressive strength of M<sub>1</sub> + M<sub>3</sub>

**Table 5:** Spilt tensile strength of M<sub>1</sub> + M<sub>3</sub>

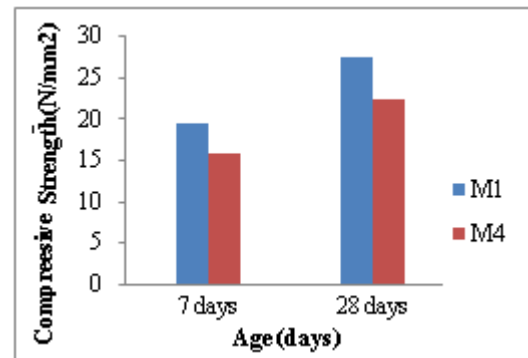
Age (days)	M <sub>1</sub>	M <sub>3</sub>
7	1.27	3.19
28	2.45	4.5



**Figure 4:** Spilt tensile strength of M<sub>1</sub> + M<sub>3</sub>

**Table 6:** Compressive strength of M<sub>1</sub> + M<sub>4</sub>

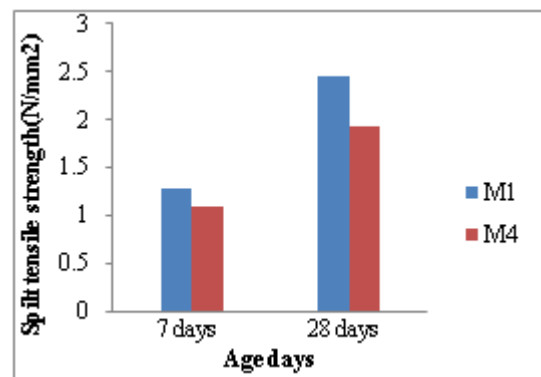
Age (days)	M <sub>1</sub>	M <sub>4</sub>
7	19.56	15.92
28	27.65	22.49



**Figure 5:** Compressive strength of M<sub>1</sub> + M<sub>4</sub>

**Table 7:** Spilt tensile strength of M<sub>1</sub> + M<sub>4</sub>

Age (days)	M <sub>1</sub>	M <sub>4</sub>
7	1.27	1.09
28	2.45	1.94



**Figure 6:** Spilt tensile strength of M<sub>1</sub> + M<sub>4</sub>

**Table 8:** Densities of concrete

Density	M <sub>1</sub> (kg/m <sup>3</sup> )	Replacement of M <sub>2</sub> (%) (kg/m <sup>3</sup> )			M <sub>3</sub> (kg/m <sup>3</sup> )	M <sub>4</sub> (kg/m <sup>3</sup> )
		10	20	30		
Cube	2962	3022	3111	3170	3117	2518
Cylinder	2735	2697	2700	2740	2546	2170

## 5. Conclusion

In this study, the density and strength characteristics of concrete by volume replacement of cement by 10%, 20%, 30% fly ash, fully replacement of sand by quarry dust and 25% replacement of coarse aggregate with coconut shells were investigated. It was concluded that,

- Compared the density of concrete was decreases with M<sub>4</sub> than M<sub>1</sub>, increases with M<sub>2</sub>, M<sub>3</sub> than M<sub>1</sub>
- Compared the compressive strength of concrete was decreases with M<sub>4</sub> than M<sub>1</sub>, increases with M<sub>2</sub>, M<sub>3</sub> than M<sub>1</sub>
- Compared the Spilt tensile strength of concrete was decreases with M<sub>4</sub> than M<sub>1</sub>, increases with M<sub>2</sub>, M<sub>3</sub> than M<sub>1</sub>.

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