CHAPTER 6

CONCLUSIONS

6.1 GENERAL

Based on the experimental investigations on flexural and impact strength behaviour of ferrocement laminates cast by partial replacement of cement with fly ash content varying from 10%, 15%, 20%, 25% and 30% together with a constant 5% silica fume by weight of cement and reinforced with chicken mesh and weld mesh, salient conclusions are drawn and presented. The experimentally obtained ultimate moment capacity is compared with analytical study. The results and discussions of the experimental investigation on flexural strengthening of R.C beams with ferrocement laminates and a comparison of the ultimate moment capacity with analytical study are also provided.

6.2 SALIENT CONCLUSIONS

- The mortar mix was found to have a composition of 1:2 mortar mix, 0.35 water binder ratio, 0.6% dosage of the super plasticizer with partial replacement of cement with fly ash 20% together with a constant 5% silica fume is suitable for casting ferrocement elements.

- The maximum first crack load was 50% greater than specimen with weld mesh of volume fraction 2.348% and 18% greater than specimen with chicken mesh of volume fraction 3.77%. The maximum ultimate load was 37% greater than specimen with weld mesh of volume fraction 2.348% and 20% greater than specimen with chicken mesh of volume fraction 3.77%.
The energy absorption capacity of specimens with 20% fly ash and 5% silica fume reinforced with weld mesh of volume fraction 2.348% and chicken mesh of volume fraction 3.77% was increased by 23% and 16% respectively when compared with control specimens.

The ductility factor of specimens with 20% fly ash and 5% silica fume reinforced weld mesh of volume fraction 2.35% and chicken mesh of volume fraction 3.77% was increased by 9% and 25% respectively when compared to control specimens.

From an overall assessment i.e. the maximum first crack load, ultimate load, deflection, energy absorption, optimum results were obtained for ferrocement laminates with galvanized square weld mesh with a volume fraction of 2.348% and replacement of cement by fly ash 20% and silica fume 5%, which can be used for strengthening of RC beams.

There were increases in energy absorption due to impact load of 57% and 45% at initial and at failure for specimen with 20% fly ash and 5% silica fume reinforced with weld mesh of volume fraction 2.348% compared to control specimens. There were increases in energy absorption of 36% and 40% at initial and a failure for specimen with 20% fly ash and 5% silica fume reinforced with chicken mesh of volume fraction 3.77% compared to control specimen.

First crack load, ultimate load, ductility ratio, energy absorption, and flexural performance of reinforced concrete beams, strengthened with ferrocement laminates reinforced with volume fraction of mesh reinforcement 2.35% and replacement of cement by fly ash 20% and silica fume 5%, are found to be increasing by 64%, 95%, 34% and 41% respectively compared to control beam.
The ultimate moment carrying capacity of the ferrocement laminates is determined by theoretical model developed by both elastic and plastic analysis matching with experimental results with $\pm 20\%$ variation.

An equation for finding ultimate moment carrying capacity of the control beam and strengthened beams were developed and validated with the experimental results.

6.3 RECOMMENDATIONS FOR FUTURE WORK

The research studies in the future would do well when the following recommendations are considered:

- The concept of utilizing fly ash and silica fume in the development of sandwich elements for their application in floors and slabs.

- A systematic study towards the optimization of the volume fraction of reinforcement combining high tensile steel mesh, mild steel mesh and steel bars in the ferrocement laminates may be undertaken.

- An experimental study can be carried out to investigate the flexural behaviour of ferrocement reinforced with other types of mesh for cost effectiveness.

- Extensive study on the structural behaviour of full scale ferrocement members under biaxial bending and combined loading with different end conditions.

- Shear strengthening which is not considered would be worth needing further investigation.
• In this research, static loading alone is considered. The strengthening of beam under dynamic loading and cyclic loading need to be probed.

• Elaborate tests and studies are needed to assess the probable economic prospects of combining ferrocement and reinforced concrete as a composite material and the use of ferrocement as permanent formwork for reinforced concrete.

Ultimately, ferrocement technology is an emerging area with a wide scope for further research. Particularly, the research towards the utilization of industrial wastes for the replacement of cement or sand in ferrocement applications will solve the industrial problems to a considerable extent. However, it needs to be economical, eco-friendly, and efficient without compromising its performance.