CRITERION 1 CURRICULAR ASPECTS			
1.3 CURRICULUM ENRICHMENT			
1.3.3. Percentage of students undertaking project work/ field work/ Internship (Data for the latest completed academic year 2022 -2023)			
Program Name	**Program Code**	**List of Students undertaking project work/ field work/ Internship**	**Page No.**
M.E. SE	413	Jeyadharani J	2
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M.E. SE	413	Karthikeyan M	8
M.E. SE	413	Kavimalan R	9
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STUDY ON POND ASH AS A PARTIAL REPLACEMENT OF FINE AGGREGATE IN GGBS BASED CONCRETE

A THESIS

Submitted by

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in partial fulfillment for the award of the degree of

MASTER OF ENGINEERING IN STRUCTURAL ENGINEERING

NPR COLLEGE OF ENGINEERING AND TECHNOLOGY,
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OCTOBER 2023

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BONAFIDE CERTIFICATE

Certified that this Thesis titled **"STUDY ON POND ASH AS A PARTIAL REPLACEMENT OF FINE AGGREGATE IN GGBS BASED CONCRETE"** is the bonafide work of **JEYA DHARANI J (920821413001)** who carried out the work under my supervision. Certified further that to the best of my knowledge the work reported herein does not form part of any other thesis or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

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INTERNAL EXAMINER

EXTERNAL EXAMINER

ABSTRACT

Concrete is the most widely used construction material in India with annual consumption exceeding 100 million cubic metres. It is well known that conventional concrete designed on the basis of compressive strength does not meet many functional requirements such as impermeability, resistance to frost etc.

The production of the Portland cement as a main constituent of concrete has basically led to the dangerous impacts on our environment by releasing substantive amount of CO_2. Production of one ton of Portland cement emits one ton of CO_2 and other greenhouse gases. Hence the cement must be effectively replaced by some other cementitious materials without compromising the desired properties of concrete. The coal based power plant generates a huge amount of fly ash which is collected from electrostatic precipitator and the bottom ashes are disposed in a slurry form in large ponds and dykes. Pond Ash requires huge area, water and energy to dispose off, so recycling of the pond ash is indeed required.

The purpose of this study is to find the suitability of GGBS as a replacement material for cement and pond ash as a replacement material for fine aggregate without compromising the strength & durability of conventional concrete. Replacement of cement partially by GGBS also reduces the supply demand on cement and may also reduce the emission of CO_2 into atmosphere. The physical and chemical properties of GGBS and pond ash has been studied and both the industrial wastes are used to replace the cement and fine aggregate up to 40% and 20% respectively in concrete. The specimens were tested for its mechanical properties such as compressive strength, split tensile strength and flexural strength on 7, 28, 56 days and durability properties like water permeability and chloride permeability.

After determining the properties of the concrete mixes, the optimum percentage of replacement levels of GGBS and pond ash were found out and PCC Beams were casted to determine the flexural strength for all the concrete Mixes. It is found that replacement of cement by 30 % of GGBS and fine aggregate by 20 % of pond ash gives optimum results in the compressive strength, split tensile strength and flexural strength tests.

CHAPTER 8

CONCLUSION

8.1 CONCLUSIONS

This research is focused on comparative study of using GGBS and Pond Ash to produce Eco-friendly concrete. The significant conclusions drawn from the study are given below.

- As the percentage of replacement of pond ash increases, the weight of the specimens reduced due to low density of pond ash.
- It is noticed that there is reduction of compressive strength of concrete mixes at 14 and 28 days of curing. At 56 days, the compressive strength of the mixes gets improved.
- The value of split tensile strength and flexural strength of optimized mix also increases at 28days testing due to addition of pond ash and GGBS.
- The durability of optimized concrete mix under HCl, H_2SO_4 and $MgSO_4$ solution performed better than the control concrete.
- Replacement of cement by 30 % of GGBS and fine aggregate by 20 % of pond ash gives optimum results in the compressive strength, split tensile strength and flexural strength tests.

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