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# The Impact of Various Liapor Volume Fraction on the Mechanical Properties of Lightweight Concrete

Research Project

Submitted to the to the department of (Geomatics Engineering) in  
partial fulfilment of the requirements for the degree of BSc

By

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## **SUPERVISOR CERTIFICATE**

This dissertation has been written under my supervision and has been submitted for the award of the 4<sup>th</sup> stage student project with my approval as supervisor.

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I confirm that all stipulated requirements have been met and confirmed.

## EXAMINING COMMITTEE CERTIFICATION

We certify that we have read this thesis Dissertation : **Mechanical Properties of Lightweight Concrete Produced With Lightweight Expanded Clay Aggregate** and as an examining committee examined the students (Abdulmateen Muhammed Jalal, Tablo Mazn Xalid, Safa Sabr Sleman) in its content and what related to it. We approve that it meets the standards of a Dissertation for the degree of BSc.

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## ***Dedication***

*We dedicate this project to God Almighty our creator*

*Our strong pillar*

*Our source of inspiration*

*This project is dedicated to all those who believe in the power of dreams*

*To our family*

*For their unconditional love and unwavering support*

*To our teachers and mentors*

*For their guidance and wisdom*

*To our friends*

*For their constant encouragement and belief in us*

*Your faith in our abilities has been a driving force behind this project*

*Thank you*

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## Abstract

This study is focused on the experimental investigation of mechanical properties of lightweight concrete mixtures with Lightweight Expanded Clay Aggregate (LECA) as coarse aggregate and limestone as a filler material also river sand as fine aggregate, cement and super plasticizer to create a concrete with lighter weight than normal weight concretes and keeping the strength and act as structural concrete to be used in construction. The performed experimental studies have revealed the tendencies of possible usage of different amounts of lightweight aggregates and their combinations in the production of concrete mixtures depending on the demands of practical application. The samples exhibited variations due to the different volume percentages of Liapor, leading to changes in their weight and mechanical properties. Assessment of the workability of Light Weight Concrete (LWC) was conducted using the slump test, revealing that the slump increased with higher percentages of superplasticizer in the samples. Based on the tests we can say that the compressive strength is within the ACI codes that can be used as structural concrete since the compressive strength is higher than 17 Mpa, the result of weight reduction in this experiment is up to 51.58% of normal weight concrete. the compressive strength varied between (30.41 MPa and 38.98 MPa) which is more than enough to be used as structural concrete, and the compressive strength of the cylinder is 81.5% of the compressive strength of the cube, and the splitting tensile has been tested on the samples which was ranging from (1.54 Mpa to 2.99 Mpa). The samples also have been undergoing the modulus of elasticity test and the results are as following (11939 Mpa to 17756 Mpa).



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