



## EVALUATION OF SOME MECHANICAL PROPERTIES OF GRANITES IN PARTS OF SOUTH-WEST NIGERIA

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### Abstract

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*This work provides an estimation of some engineering properties and behaviours of some rocks in parts of South-West Nigeria for use under various applications, planning and design of construction projects. In mining operations especially drilling and blasting, the brittle fracture of rock in-situ is a very good indicator for rock fragmentation and rock strength characterization. This work determined some strength characteristics and fracture behaviour of granite rocks in four different locations in Ondo and Ekiti States, Nigeria. Granite rocks were sampled, prepared and tested in the laboratory for the Uniaxial Compressive Strength (UCS) using 1100kN compression machine, Tensile Strength (TS) using Brazilian test and Point Load Strength Index (PLSI) using point load tester. Analysis on the strength characteristics of the selected rocks show that the UCS range from 110.65-173.76MPa, TS from 11.94 to 15.46 MPa and PLSI from 5.76 to 7.03MPa. From the result of the analysis, the rocks are classified as very high and high based on their UCS and PLSI respectively. The degree and nature of deformation of the rocks indicated brittle and intergranular fracture. It was found out that the plane of fracture is simple and its nature and description is axial splitting failure in uniaxial compression. The results also show that the strength parameters are positively correlated. The rock strength and behaviour database generated will serve as useful information to granite quarry operators and investors in quarry planning, equipment selection and organization [FJPAS 1(1) 2016].*

### 1.0 Introduction

Rocks are aggregates of crystals and amorphous particles joined together by varying amounts of cementing materials. Rocks are made up of a more or less invariable composition bounded together by forces of molecular attraction (cohesion) that arise either at the sites of direct contact of mineral with one another or at sites of their contact with mineral particles or extraneous cementing substances [1]. Rocks exhibit a vast range of properties which reflect vast varieties of structures fabric and compound, some basic properties measurements which are essential for describing rocks are physical and mechanical properties.

Mechanical properties of rock are characterized by the reaction of rocks to the effect of a force of its environment and it depends on the nature of rock substance, the stratigraphy of rock, rock defects and testing methodology. Such mechanical properties of

rocks include compressive strength, tensile strength and point load strength index which were estimated in this work. Rock properties are essential for the prediction of the engineering behaviour of rocks under various applications and planning of mining project. The strength characteristics of rocks are usually considered to be necessary for design of rock structures, stability of rock excavations as well as influence rock fragmentation in quarry and working of mine rocks. This work provided an improved estimation of engineering properties of rock which will guide managers of construction industry and aid quarries and mines operators to select appropriate tools for their operations.

### 2.0 Strength and deformability

Strength and deformability of rocks and joints has been the subject of numerous experimental investigations, [8]. Certain empirical indices