



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Programme of Study : Ph.D.
Thesis Title: Robustness of Primitive and L-Primitive Words
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Thesis Submitted to the Department/ Center : CSE
Date of completion of Thesis Viva-Voce Exam : 29/11/2018
Key words for description of Thesis Work : Primitive words, Del-robust, L-primitive, pseudo-superprimitive words

SHORT ABSTRACT

Word combinatorics is a field which aims to study on the languages of words over some alphabet containing symbols, to understand the properties, counting of these languages with respect to the concatenation, insertion, deletion of symbols. The most important problem in the field of Word combinatorics is primitive words, their properties and robustness on primitive words. We investigate the effect on primitive words of point mutations (inserting or deleting symbols, substituting a symbol for another one), of morphisms, and of the operation of taking prefixes.

A word is said to be primitive if this cannot be written as proper power of a smaller word. It is a long standing important open problem whether the language of primitive words is a context-free language. Various primitive words and robustness on them are studied:

1. Some primitive words are the words that remains primitive on the operations, viz. substitution of any arbitrary symbol from the primitive words, deletion or insertion of a symbol in the primitive words or exchange of consecutive symbols. The properties of the languages of such primitive words are also discussed.
2. A word is L-primitive if it is not a proper power of a shorter word from the language L. We find the property of language L such that the set QL, language of L-primitive words over an alphabet is reflective. We also find the shortest language L such that $QL = Q$. We discuss that the robustness on the language of L-primitive words.
- 3 Many study is done on Pseudo-primitive words and quasi-primitive words in last one decade. Robustness on the language of pseudo-primitive words with a morphic involution. It is proved that a language of ins-robust pseudo-primitive words is not regular for an involution morphism.