

UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

MATHEMATICAL MODELLING OF
SPLICING SYSTEM OF DNA MOLECULES
USING PERMUTATION GROUP

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IN THE NAME OF ALLAH, THE MOST GRACIOUS, THE MOST MERCIFUL

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ABSTRACT

Splicing system is a formal recombinant behavior of DNA molecules that undergo the process of cutting and pasting with the presence of an enzyme which is ligase. The splicing system between finite languages will only produce regular languages which are the lowest level of languages in the Chomsky hierarchy. It is important to increase the level of languages in order to propose theoretical DNA-based computers. Therefore, to increase the level of language up to recursively enumerable languages, splicing system are considered with several restrictions as splicing rule. In this report, permutation group is used as a restrictions in the splicing system. Hence, splicing system over some permutation group has increased the level of languages generated according to Chomsky hierarchy.

1 INTRODUCTION

1.1 Research Background

In the perspective of science, Deoxyribonucleic acid (DNA) is a molecule that contains all the information to be used in the growth, development, functioning, and reproduction of all living organisms. DNA occurs as a pair of molecule not as a single molecule. These molecules are coil in the shape of a double helix and the helix is kept steady by hydrogen bonds. DNA consists of two chains of repeated nucleotides and each nucleotide has three components. The three components are phosphate group, sugar and a nitrogenous base. One of the components from nucleotide is nitrogen. Nitrogen comprising of base known as cytosine (C), adenine (A), guanine (G), and thymine (T) which are to perform computation.

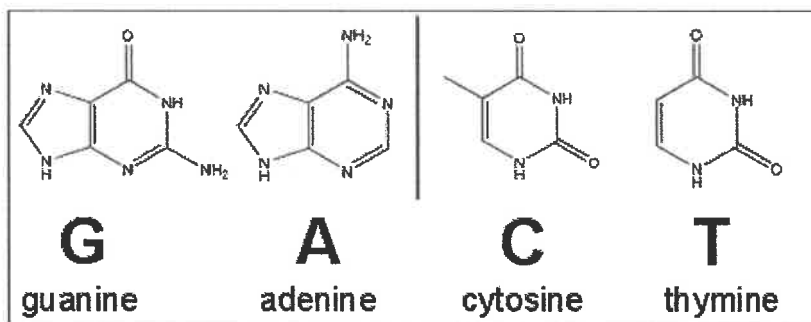


Figure 1.1: The molecule structures from adenine, guanine, thymine and cytosine.