UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

CHROMATICITY OF 6-BRIDGE GRAPH $\theta(3,3,3,b,c,c)$

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Report submitted in partial fulfillment of the requirement
for the degree of
Bachelor of Science (Hons.) Mathematics
Center of Mathematics Studies
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JULY 2016

ACKNOWLEDGEMENTS

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

Firstly, we are grateful to Allah S.W.T for giving us the strength to complete this project successfully.

We would like to express our very great appreciation and gratitude to Mrs. Siti Nurul Fitriah binti Mohamad as our supervisor for the patient guidance, encouragement and advice she has provided throughout our time as her students. We have been extremely lucky and thankful to have a supervisor who cared so much about our work, and who responded to our questions promptly. It would never have been possible for us to finish this project without her incredible support, encouragement and assistance in keeping our progress on schedule.

Our grateful thanks are also extended to Mrs. Wan Khairiyah Hulaini binti Wan Ramli who is our coordinator for subject MSP660, Prof. Madya Dr Jusoh Yacob and Mrs. Wan Ruslini binti Wan Yusoff for their help in giving us briefing and guidance what should have in our project report. Then, we are also very thankful to our generous friends in giving their hands for helping us. Finally, we wish to thank our parents for their support and encouragement throughout our study.

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ABSTRACT

Consider two graph G and H. For graph G, let $P(G,\lambda)$ denote the chromatic polynomial of a graph G and $P(H,\lambda)$ denote the chromatic polynomial of a graph H. Graph G and H are chromatically equivalent, $G \sim H$, if $P(G,\lambda) = P(H,\lambda)$. A graph G is said to be chromatically unique, χ-unique, if for any graph H, H is isomorphic to G, denoted by $G \sim H$ implies $G \cong H$. To find the uniqueness of the graph, we will use the theorems and lemmas that have been used by others researchers in finding the k-bridge graph for $k \leq 5$. In this project, we have studied about the chromatic uniqueness of a new family of 6-bridge graph which is $\theta(3,3,3,b,c,c)$.

1 INTRODUCTION

1.1 Introduction

Graph theory discovered for the first time after the problem of The Seven Bridge of Konigsberg successfully solved by Leonhard Euler in 1735. The Four-Colour Problem was first postulated by Francis Gurthrie in 1852, while trying to colour a map of the countries of England. This problem is determine whether four colours are sufficient in order to colour any maps so that the neighbouring countries have different colours. This problem was presented by Arthur Cayley to the London Mathemathical Society in 1878 after it was passed to De Morgan by Francis Gurthrie. The Four-Colour Problem lead to the born of new function introduced by Birkhoff (1912) called a chromatic polynomial of M denoted by $P(M,\lambda)$ that give the number of proper $\lambda - colouring$ of a maps using at most λ distinct colours.

In 1968, Read (1968) asked: What is a necessary and sufficient condition for two graphs to be chromatically equivalent; that is, to have the same chromatic polynomial? Later on, in 1978 Chao and Whitehead Jr. defined a graph to be chromatically unique if no other graph share its chromatic polynomial and another question appear: What is a necessary and sufficient condition for a graph to be chromatically unique? They gave several families of chromatically unique graphs Chao & Whitehead Jr. (1978), Chao & Whitehead (1979b), Chao & Whitehead (1979a), Chao & Zhao (1983). Many researchers have been studying chromatic uniqueness and chromatic equivalent of graphs and various families and result on chromatic uniqueness and chromatic equivalence of graphs have been obtained successively.

A graph G is an ordered pair $(V(G),E(G))$ which consists of a non-empty finite set $V(G)$ of elements called vertices and finite family $E(G)$ of unordered pairs of elements of $v(G)$ called edges. The edges consists with two possibly identical vertices as its endpoint. Each vertex is referred by a point and each edges is referred by a line joining the vertices. The order of G, denoted by $v(G)$ is the number of vertices in G while the size of G, denoted by $e(G)$ is