PREFACE

Praise and gratitude to Allah SWT for His blessings and grace, so that the author can finish this thesis well. This thesis was prepared to fulfill some of the requirements needed to achieve a Sarjana Pendidikan degree at the Bilingual Physics Education Study Program, Faculty of Mathematics and Natural Sciences (FMIPA), Universitas Negeri Medan.

The author realizes that the preparation of this thesis could not be completed without the support of various parties, either directly or indirectly. Through this opportunity, the author would like to express his gratitude to all those who have helped in the preparation of the thesis. The author's deepest gratitude goes to Mr. Dr. Alkhafi Maas Siregar, M.Si. as Thesis Supervisor, who has provided guidance, advice and motivation so that all stages in the preparation of this thesis can be passed well. To Mr. Prof. Dr. Sahyar, MS., MM., Mr. Sabani, S.Pd., M.Si., Mr. Deo Demonta Panggabean, S.Pd., M.Pd., as Examiner Lecturers, who have provided criticism and suggestions for improvement ranging from proposal seminars to at the stage of defending the thesis, so that this thesis can be completed well. To Mr. Prof. Dr. Motlan, M.Sc., Ph.D., as the Academic Advisor who has guided and assisted the author during his lectures at the State University of Medan. To Mr. Dr. Wawan Bunawan, M.Pd., M.Si., as the Head of the Physics Department, Mrs. Dr. Ely Djulia, M.Pd as the Bilingual Program Coordinator, and Mrs. Dr. techn. Marini Damanik, M.Si., as Secretary of the Bilingual Program, who has assisted the author during the preparation of this thesis and during the lecture period at the State University of Medan.

The author's gratitude also goes to the Principal and Physics Teacher at SMAN 2 Medan, Drs. Buang AS., and Ms. Azroini S.Pd., M.Si, Principal and Physics Teacher at SMAN 12 Medan, Ms. Dra. Ade Melinda Banjarnahor, M.Si., and Ms. Fitriani Nasution, S.Pd., Principal and Physics Teacher at SMAN 14 Medan, Ms. Supraba Ika Sari, S.Pd., M.Pd., and Mr. S. Tampubolon, S.Pd., Principal and Physics Teacher at SMA Swasta Darussalam Medan, Mr. Julheri, ST., and Mrs. Raudhatul Kamal, S.Pd., Principal and Physics Teacher at SMA

Swasta Kartika I-2 Medan, Mr. Muhammad Syahril Nst, S.Ag., and Mrs. Henny Syariah Siregar, S.Pd., for their help, they accepted and gave the authors the freedom to conduct research at the school.

Especially, the author would like to thank the author's parents, Mr. H. Jamiluddin, SE. Ak., and Mrs. Hj. Lusiana R. A. Daulay for every support, love, enthusiasm, patience, and prayers that are always offered to the author for smooth and easy during this education. The author would also like to thank the author's brothers, sisters and brothers, Ahmad Faisal, Annisa Faradina, S. Kom., and Fakhri Hafizh, as well as the entire extended family of the author who has given encouragement and always listened to the author's complaints.

The author would like to thank friends in the Bilingual Physics Education class 2017, and friends during lectures Dwi Anggreani Hanifah, Rizka Utari Rahmadani, Elfi Dwi, and Ruth Sondang, who have always been with the author since the beginning of the lecture period until now.

The author realizes that this thesis still has shortcomings and limitations, however, while expecting constructive criticism and suggestions, the author hopes that this thesis can be useful for related parties.

Medan, 5 January 2022 Author,



Aulia Ramadhani NIM. 4171121003