UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

A COMPARATIVE STUDY ON SOLVING NONLINEAR SECOND ORDER DIFFERENTIAL EQUATION BY USING MODIFIED FOURTH ORDER RUNGE-KUTTA METHOD AND MODIFIED ADM

P37M23

NURSYAFIQA BALQIS BINTI MOHD ZULHISYAM
SITI MARYAM BINTI BAHROWI
NUR HIDAYAH BINTI ZAINOL ABIDIN

Bachelor of Science (Hons.) Mathematics
College of Computing, Informatics and Mathematics

AUGUST 2023

UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

A COMPARATIVE STUDY ON SOLVING NONLINEAR SECOND ORDER DIFFERENTIAL EQUATION BY USING MODIFIED FOURTH ORDER RUNGE-KUTTA METHOD AND MODIFIED ADM

NURSYAFIQA BALQIS BINTI MOHD ZULHISYAM- 2020834984
SITI MARYAM BINTI BAHROWI- 2020827848
NUR HIDAYAH BINTI ZAINOL ABIDIN- 2020499064
P37M23

Report submitted in partial fulfillment of the requirement
for the degree of
Bachelor of Science (Hons.) (Mathematics)
College of Computing, Informatics and Mathematics

AUGUST 2023

ACKNOWLEDGEMENTS

TABLE OF CONTENTS

ABSTRACT

Differential Equations are highly useful in practically every field of Engineering, Science, and Mathematics for addressing complicated mathematical issues. A variety of real-world issues in mathematics take the form of differential equations. These differential equations can be classified as either ordinary or partial differential. It is particularly challenging to handle nonlinear second order ODEs due to their nonlinearity. Numerical methods are often employed to solve these equations. However, higher order and nonlinear terms make these equations more complex. This is because it requires tedious algebraic calculations, and the result may diverge. Thus, this study aims to solve the nonlinear second order differential equation (ODE) by using Modified Fourth Order Runge-Kutta Method and the Modified Adomian Decomposition Method. The accuracy and the efficiency of both methods are determined by comparing absolute errors. The findings in this study show that these two methods are capable of solving the nonlinear second order ODEs. However, in terms of accuracy and efficiency the Modified Fourth Order Runge-Kutta Method is better than MADM because it has the smallest absolute error even though these methods required tedious calculations. Therefore, further study is suggested to be conducted with the use of other numerical methods such as n-Step Adam Bashforth Method, Shooting Method, Newton-Raphson Method, or Finite Difference Method for solving the nonlinear ODEs with higher order effectively.