UNIVERSITI TEKNOLOGI MARA

JIICaS 2023

JOHOR INNOVATION INVENTION COMPETITION AND SYMPOSIUM 2023

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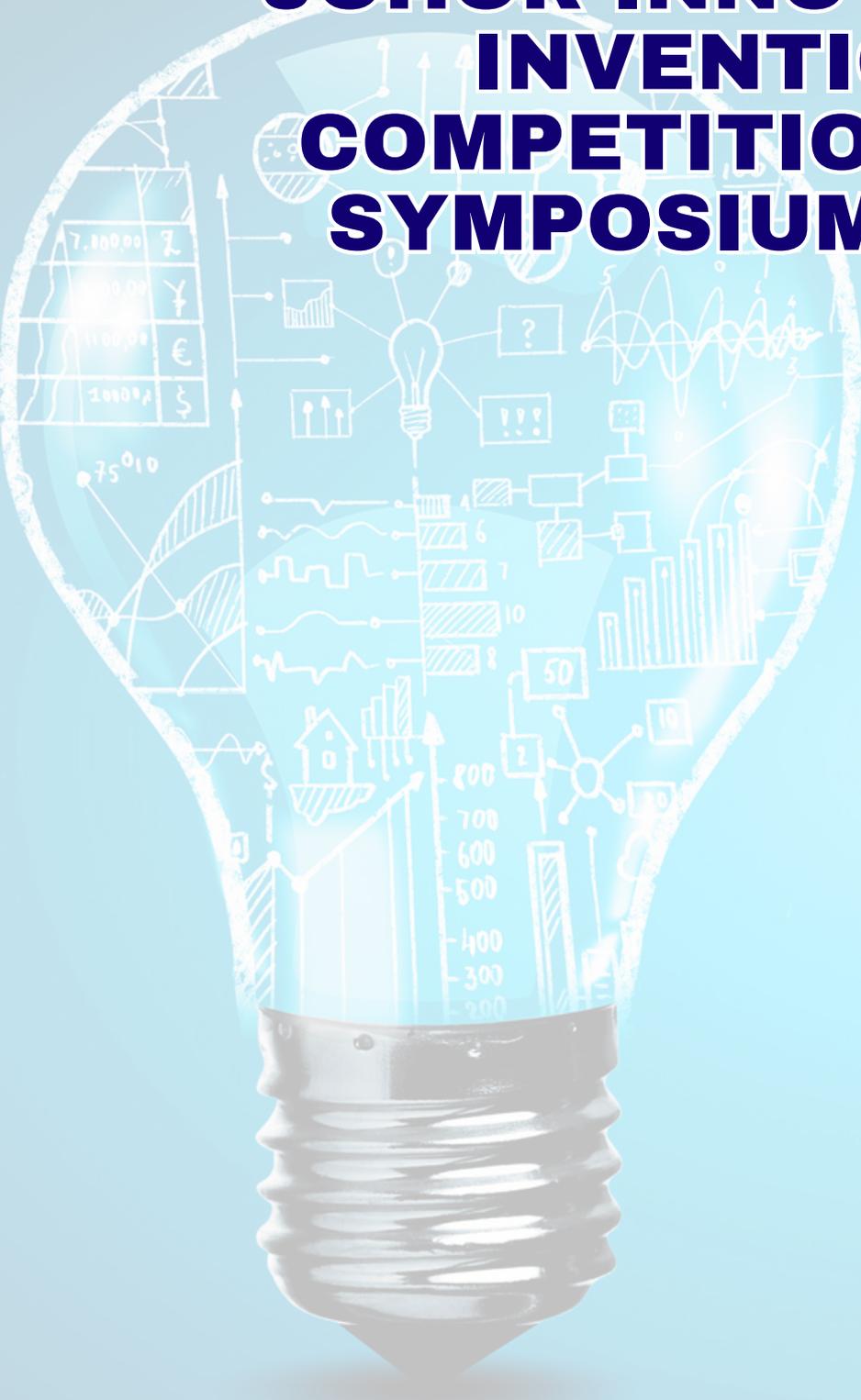" Innovation Inspires a Society to be Critical and Creative"

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" Innovation Inspires a Society to be Critical and Creative"

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UNIVERSITI TEKNOLOGI MARA

Cawangan Johor
Kampus Pasir Gudang

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Preface

In the name of Allah, the Almighty who gives us the enlightenment, the truth, the knowledge and with regards to Prophet Muhammad (peace be upon him) for guiding us to the straight path. We thank to Allah for giving us guidance and strength to write this e-book.

This e-book compiles the extended abstracts that submitted to Johor Innovation Invention Competition and Symposium 2023 (JIICaS2023), where JIICaS2023 is a virtual platform for all creative minds to share and present their invention and innovation. The extended abstracts are divided into two categories, which are Category A (Higher Educational Student/ Any Recognized Institutional Students in Malaysia) and Category B (Primary/ Secondary School Students / Special Education School Students in Johor). Each abstract gives a brief background on the innovation or project.

We hope that this e-book will help the readers to get to know the innovation done by the students from both categories and get some ideas to develop future innovation products.

ANALYZING LANDSLIDES USING RELATED RATES AND DIFFERENTIATION

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ABSTRACT

A landslide refers to the movement of a mass of soil or rocks. It is a natural disaster that can cause significant damage to human lives, infrastructure, property, and environment. To minimize the effects of landslides, it is essential to recognize the causes and create reliable warning systems. This innovation idea explores the application of related rates and differentiation in analyzing landslides. It also emphasizes how these mathematical formulas can be used to determine the rate of change associated with landslides. The aim of this innovation is to highlight the significance of mathematical equations in understanding the movement of landslides. Therefore, it is important to note that this is a simplified example and real-world landslides may require more complex mathematical models for analysis and considerations. By utilizing the simple concept of related rates, we can expand our understanding of landslides and this information can be used for management and prevention.

Keywords: Related rates, Differentiation, Landslide

1.0 INTRODUCTION

Landslide is one of the most aggressive natural disasters that cause loss of lives and cost damages every year. It destroys the environment, resources, property, and people. Numerous studies have been carried out to identify landslides and to analyze the hazard from landslides including the type, location, stability, trigger factors, susceptibility and risk (Zhao & Lu, 2018). Most of these studies were aimed at increasing the accuracy of landslide prediction by finding suitable techniques for the respective study area.

Alkhasawneh et al. (2014) demonstrated decision tree models that determined factors that may be involved in landslide susceptibility. The results can be used to help mitigate hazards to people and facilities and as basic data for developing plans to prevent landslide hazards, such as in locating, monitoring, and facility sites. Meanwhile, Ur Rehman et al., (2020) applied the potential technique used for landslide identification and investigation. The technique named as Interferometric Synthetic Aperture Radar (InSAR) successfully identified the rates of the movement of the landslides in northern Pakistan area. All the methodologies used can provide the identification of all possible landslides areas that could either directly affect the communities or result in geohazards.

2.0 OBJECTIVE

The aim of this innovation is to highlight the significance of mathematical equations in understanding the movement of landslides.

3.0 DESCRIPTION OF INNOVATION/METHODOLOGY

This innovation demonstrates how related rates and differentiation are applied in the analysis of landslides using mathematical calculations. Additionally, the innovation can serve as guidance for students who face difficulties with this topic.

4.0 ADVANTAGE/IMPACT/RESULTS/NOVELTY

The innovation offers an interactive video learning to assist students in understanding the topic on Related Rates in Calculus 1 syllabus.

5.0 CONCLUSION

Analyzing landslides using related rates and differentiation provides a powerful toolset for controlling the risk associated with these natural disasters. The application of mathematical models assists early warning systems, risk assessments, and engineering design. By combining knowledge and techniques, scientists, engineers, and policymakers may collaborate together to minimize the impact of landslides and protect vulnerable communities.

6.0 REFERENCES

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