SAMPLE CAPSTONE PROJECT REPORT

NAME:PURAM PRAKASH ROYAL

REGISTER NO:192111701

COURSE CODE/NAME: CSA0917-JAVA PROGRAMMING

PROJECT TITLE : SCIENTIFIC CALCULATOR

OBJECTIVE:

The objective of a scientific calculator is to provide users with advanced mathematical functions and operations that go beyond basic arithmetic.

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| TASK/DURATION | **21.02.2024** | **22.02.2024** | **23.02.2024** | **24.02.2024** | **26.02.2024** | **27.02.2024** |  |  |
| LITERATURE SURVEY |  |  |  |  |  |  |  |  |
| MODULE 1 DESIGN |  |  |  |  |  |  |  |  |
| MODULE 2 DESIGN |  |  |  |  |  |  |  |  |
| MODULE 1 IMPLEMENTATION |  |  |  |  |  |  |  |  |
| MODULE 2 IMPLEMENTATION |  |  |  |  |  |  |  |  |
| DEMO & PRESENTATION |  |  |  |  |  |  |  |  |

INTRODUCTION:

A scientific calculator is a specialized electronic device designed to perform a wide range of mathematical functions and computations beyond basic arithmetic. Unlike simple calculators, which are primarily used for addition, subtraction, multiplication, and division, scientific calculators offer advanced features such as trigonometric functions, logarithms, exponentials, statistical calculations, and more.

The introduction of scientific calculators revolutionized the way complex mathematical tasks are handled in various fields such as education, engineering, science, and finance. These calculators provide users with a compact and portable tool to perform intricate calculations quickly and accurately, eliminating the need for manual computations or lengthy tables.

Early scientific calculators were standalone devices with limited functionality compared to modern versions. However, advancements in technology have led to the development of more powerful and feature-rich scientific calculators. Today, scientific calculators come in various forms, including handheld devices, software applications, and built-in functionalities in computers and smartphones.

In addition to standard mathematical functions, many scientific calculators also offer programmability, allowing users to create custom functions and automate repetitive calculations. This flexibility makes scientific calculators indispensable tools for professionals, students, researchers, and anyone who deals with complex mathematical problems on a regular basis.

Overall, the introduction of scientific calculators has greatly enhanced efficiency and productivity in fields requiring advanced mathematical computations, contributing significantly to advancements in science, engineering, and technology.

LITERATURE SURVEY:

1. Intelligent building development and LabView-based modelling of a net zero-energy strategy by Fatimah Salihah Radzuan

This study aims to investigate the effects of scientific calculators on mathematics achievement in support of problem-solving instructions. In this study, 49 low achieving mathematics students aged 14 years were selected from a secondary school in Kajang, Selangor, Malaysia. A pre-test post-test quasi-experimental design with two groups was employed in this action research study. The experimental group learned solid geometry and statistics topics, with the aid of a scientific calculator; while the control group did not use any technological aid to learn these topics. By controlling the pre-test score, the ANCOVA two-way test was applied to the post-test results. A positive significant difference was reported in favour of the experimental group. However, no significant interactions were noted between group and gender. The analysis results indicate that the use of a scientific calculator in the integrated teaching and learning of mathematics helped the students improved their mathematics achievements.

2. DESIGNING OF SCIENTIFIC CALCULATOR WITH CASE STRUCTURE USING NI LABVIEW SOFTWARE BY SHAMILI A R.

The paper presents an intelligent building (IB) development strategy emphasizing the locally available non-polluting renewable energy resources utilization. Considering the immense complexity of the topic, the implementation strategy of the main energy-flow processes is unfolded, using the net zero-energy building concept (NZEB). Noticeably, in the first research steps the mathematical background of the considered NZEB strategy has been developed and presented. Then careful LabView software-based simulations prove that the adopted strategy is feasible for implementation. The result of the above mentioned research efforts is a set of powerful and versatile software toolkits well suitable to model and simulate complex heating, ventilation and air-conditioning processes and to perform energy balance performance evaluations.

3.Integrating technology into learning mathematics: the special place of the scientific calculator by B Kissane

Technology for learning mathematics and for STEM more generally can take many forms, but this paper argues that the most likely technology to have an impact for all students in many ASEAN countries is the scientific calculator. Integration of technology into mathematics education in the twenty-first century requires good technology, an appropriate curriculum, well-educated teachers and an assessment regime that recognizes how important technology is for mathematical activity. While popular misconceptions that a calculator is only helpful for arithmetic persist, a four-part model for understanding the educational potential of scientific calculators is described and exemplified, recognising the significance of representation, computation, exploration and affirmation.

4. Challenges and benefits of using scientific calculators By Jairus P. Ochanda

The study sought to analyze the benefits to the learners, that may result from the use of scientific calculators in a Mathematics class. According to responses given by the learners, the following statistics were given as the benefits of using scientific calculators in Mathematics education as given in Table 3. The results in Table 3 were also in line with the findings from Mathematics teachers under the study, who found out the benefits arising from the use of scientific calculator in Mathematics education. The study established that, since calculators are just tools for performing computations, they have great potential as instructional aids for the development of Mathematics concepts and understanding, especially when learners are proficient in their use.

CODING OF SCIENTIFIC CALCULATOR :

import java.applet.\*;

import java.awt.\*;

import java.awt.event.\*;

public class ScientificCalculator extends Applet implements ActionListener {

TextField display;

String operator;

double operand1, operand2, result;

public void init() {

display = new TextField(10);

display.setEditable(false);

add(display);

String[] buttonLabels = {

"7", "8", "9", "/",

"4", "5", "6", "\*",

"1", "2", "3", "-",

"0", ".", "=", "+",

"sin", "cos", "tan", "sqrt", "C"

};

setLayout(new GridLayout(5, 5));

for (String label : buttonLabels) {

Button button = new Button(label);

button.addActionListener(this);

add(button);

}

}

public void actionPerformed(ActionEvent e) {

String command = e.getActionCommand();

if (command.equals("C")) {

display.setText("");

operator = "";

operand1 = operand2 = result = 0;

} else if (command.equals("=")) {

operand2 = Double.parseDouble(display.getText());

result = performOperation();

display.setText(String.valueOf(result));

operator = "";

} else {

if (command.equals("sin") || command.equals("cos") || command.equals("tan") || command.equals("sqrt")) {

operator = command;

operand1 = Double.parseDouble(display.getText());

result = performOperation();

display.setText(String.valueOf(result));

} else {

operator = command;

operand1 = Double.parseDouble(display.getText());

display.setText("");

}

}

}

public double performOperation() {

switch (operator) {

case "+":

return operand1 + operand2;

case "-":

return operand1 - operand2;

case "\*":

return operand1 \* operand2;

case "/":

if (operand2 == 0) {

return Double.NaN; // Handling division by zero

}

return operand1 / operand2;

case "sin":

return Math.sin(operand1);

case "cos":

return Math.cos(operand1);

case "tan":

return Math.tan(operand1);

case "sqrt":

return Math.sqrt(operand1);

default:

return 0;

}

}