Practical 3 : Design Test Cases for Calculator to verify its functionality.

ID	Test case	Steps.	Expected	Actual	Result
01	Test if no. is selected on click.	Click on the no. / sign.	No. must be selected.	No. is selected	Pass.
02	Test if no. are added correctly.	1) Select a no. 2) Click on (+) 3) Select another no	Result must be correct	Result is correct.	Pass.
03	Test if no. are subtracted correctly.	1) Select 10 2) Click on (-) 3) Select 5	Output must be 5	Output is 5.	Pass.
04	Test if no. are divided correctly	1) Select -4 2) Click on (x) 3) Select 2	Output must be -8	Output is -8	Pass.
05	Test if no. are subtracted correctly.	1) Select 4 2) Click on (÷) 3) Select 2	Output must be 2	Output is 2	Pass.
06	Test if user can delete a selected no.	1) Select a no. 2) Click on (del).	Number must be deleted	Number is deleted	Pass.

ID	Test Case.	Steps.	Expected	Actual	Result
07	Test if result is displayed successfully.	1) select any no. 2) select any sign. 3) select any no.	Result must be displayed	Result is displayed.	Pass.
08	Test if system display (e) while multiplication.	Multiply two 10 digit no.	Result should have a (e) with it.	Result have a (e) with it.	Pass.
09	Test if scientific calculations work.	1) Select (log) 2) select any other no. 8	Result 0.90308 must be displayed.	Result 0.90308 is displayed.	Pass.
10	Test if trigo signs work.	1) Select (sin) 3) select an angle (30)	Result 0.5 must be displayed	Result 0.5 is displayed.	Pass.
11	Test if power to works.	1) Select a no.6 2) Select (^) sign. 3) Select another no. 2	Result 36 must be displayed.	Result 36 is displayed.	Pass.

☆ Practical Related Questions :

1. State key factors to be tested in black box testing.

→ The main focus of 'Black Box Testing' is on the functionality of a system as whole. This testing method can be used to each and every level of Software Testing.

- **Unit Testing :**
  Unit Testing is testing of an individual software component or module.

- **Integration Testing :**
  Testing of all integrated modules to verify that combined functionality after integration is termed as Integration Testing.

- **System Testing :**
  It is a black box type testing that is based on overall requirement specifications and covers all the combined parts of system.

- **Acceptance Testing :**
  It is performed by the user to check if it is functioning correctly according to his needs.

2. What are the sources of knowledge for Black Box testing ?

→ The following are the sources of knowledge for Black Box Testing :

1. Decision Table Testing -
It is a software testing technique used to test system behaviour for different input combinations. It is stored in a tabular form.

2. All pairs testing -
In computer science, all-pair testing or pairwise testing is a combinational method of software testing that, for each pair of input, tests all possible discrete combinations of those parameters.

3. Equivalence Partitioning -
It is a software testing technique that divides the input data of a software into partitions of equivalent data. In principle, test cases are designed to cover each partion atleast once.

4. Boundary Value Analysis –
It is a software testing technique in which test cases are designed to include representatives of boundary values in a range.

5. Use Case Testing –
It is a functional black box testing technique that helps testers to identify test scenarios that exercise the whole system on each transaction basis from start to finish.

3. State advantages and disadvantages for Black Box testing.

→ Advantages :

1. Well suited and efficient for large scale code segments.

2. Code access not required.

3. Testing is performed from users point of view and not of designer's.

4. Test cases can be designed as soon as the specifications are complete.

Disadvantages :

1. Blind coverage, since the tester cannot target specific code segments or error prone areas.

2. Test cases are difficult to design.

3. Testing every possible input is not possible.

4. Inefficient testing as tester has inefficient knowledge about the system.

☆ Exercise :

1. Generate test cases to perform all the arithmetic operations.

→ Test cases :

ID	Test Case	Steps	Expected	Actual	Result
01	Test if no. are added correctly.	1) Select 10. 2) Select (+). 3) Select 5	Result must be 15.	Result is 15.	Pass.
02	Test if no. are subtrac -ted correctly	1) Select 10. 2) select (-) 3) select 5	Result must be 5	Result is 5.	Pass.
03	Test if no. are multiplie -d correctly.	1) Select 10. 2) Select (*) 3) Select 5.	Result must be 50.	Result is 50.	Pass.
04	Test if no. are divided correctly.	1) Select 10 2) Select (÷) 3) Select 5	Result must be 2	Result is 2.	Pass.
05	Test if power to works.	1) Select 10 2) Select (^) 3) Select 2.	Result must be 100.	Result is 100.	Pass.

2. Generate test case to perform any 4 scientific operations.

→ Test case :

ID	Test case.	Steps.	Expected	Actual	Result
01	Test if trigo sign (sin) works.	1) Select (sin) 2) Select an angle 30°	Result must be 0.5	Result is 0.5	Pass.
02	Test if trigo sign (cos) works.	1) Select (cos) 2) Select an angle 30.	Result must be 0.866	Result is 0.866	Pass.
03	Test if trigo sign (tan) works	1) select (tan) 2) Select an angle 30.	Result must be 0.8	Result is 0.8	Pass.
04	Test if trigo sign (cot) works.	1) select (cot) 2) Select an angle 30	Result must be $\sqrt{3}$	Result is $\sqrt{3}$	Pass.
05	Test if trigo sign (cosec) works	1) Select (cosec) 2) Select an angle 30	Result must be 2	Result is 2	Pass.

3. Execute test case created in Question 1 by entering following operations.

a. Perform addition of 2 positive, 2 negative numbers.

→ Test case :

ID	Test case.	Steps.	Expected	Actual	Result
01	Test if user can add 2 positive and 2 negative no.	1) Select 10 and (+) and another 10. 2) Select (+) and in brackets add (-10) 3) Select (+) and in brackets (-10)	Result must be 0. (10 + 10 + (-20)) (20 -20)	Result is 0.	Pass.

b. Perform subtraction of 2 negative and 1 positive numbers.

→ Test case :

ID	Test case	Steps	Expected	Actual	Result
01	Test if subtraction of multiple no. works.	1) Select (-) 2) Select 5 3) Select (-) 4) Select (-5) in bracket. 5) Select (-) 6) Select 5	Result must be -5. (-5-(-5) -5) (-5+5 -5) (5-5).	Result is -5	Pass.

4. Execute above test case created in question 2 by entering following operations and verify results.

a. Calculate logarithm of 8 to base of 2.

→ Test case :

ID	Test case	Steps	Expected	Actual	Result
01	Test if the (log) sign works.	1) Select (lg(8)). 2) select (÷) 3) Select (lg(2)) [This will look like : lg(8) ÷ lg(2).	Result must be 3	Result is 3	Pass.

b. Calculate values of any 4 trigonometric functions having the same theta value.

→ Test Case :

ID	Test Case	Steps	Expected	Actual	Result
01	Test if trigo sign (sin) works	1) Select (sin). 2) Select an angle 0°	Result must be 0	Result is 0	Pass
02	Test if trigo sign (cos) works	1) Select (cos). 2) Select an angle 0°	Result must be 1	Result is 1	Pass
03	Test if trigo sign (tan) works	1) Select (tan) 2) Select an angle 0°	Result must be 0.	Result is 0	Pass.
04	Test if trigo sign (cot) works	1) Select (cot) 2) Select an angle 0°	Result must be NA.	Result is NA	Pass.
05	Test if trigo sign (cosec) works.	1) Select (cosec). 2) Select an angle 0°	Result must be NA.	Result is NA.	Pass.