P6:
Design, develop, code and run the program in any suitable language to implement the binary search algorithm.
Determine the basis paths and using them derive different test cases, execute these test cases and discuss the test results.

REQUIREMENTS:
R1: System should accept(n)number of elements and key element i.e, to be searched among given n element.

R2: Check if the key element is present in array and display each corresponding position if present, otherwise report unsuccessful search.

R3: Element should be entered in the sorted order or in ascending order.

ALGORITHM
Step 1: Input value of ‘n’. Enter ‘n’ integer numbers in array
int mid;
Step 2: Initialize low = 0, high = n -1
Step 3: until (low <= high) do
mid = (low + high) / 2
if (a[mid] == key)
then do Step 5
else if (a[mid] > key)
then do
high = mid - 1
else
low = mid + 1
Step 4: Print unsuccessful search do step 6.
Step 5: Print Successful search. Element found at position mid+1.
Step 6: Stop.

Technique Used: Basis Path Testing
Basis path testing is a form of Structural testing (White Box testing).

The method devised by McCabe to carry out basis path testing has four steps.

Steps:
1. Compute the program graph.
2. From program graph, we must find (Decision-to-Decision) DD path graph.
3. Calculate the cyclomatic complexity.
4. Select a basis set of paths.
5. Generate test cases for each of these paths.

Cyclomatic complexity (CYC) is a software metric used to determine the complexity of a program.
Cyclomatic complexity is a count of the number of decisions in the source code.
The higher the count, the more complex the code.
For instance, a function with a cyclomatic complexity of 1 will always go through the same execution path.
Conversely, a function with a cyclomatic complexity value of 8 will have eight possible execution paths.

The cyclomatic complexity of a connected graph is provided by the formula:
V(G) = e – (n + 2p).
e: The number of edges.
n: The number of nodes.
p: The number of connected regions by p. Its is always 1.

If we apply cyclomatic complexity formula to the Binary Search graph, the number of linearly independent circuits is:
Number of edges = 21
Number of nodes = 15
Number of connected regions = 1
21 – (15 + 2) = 4.

Next step is to find the Basis paths.
According to cyclomatic complexity, 4 feasible basis path exists

P1: : if n value is 0.

P2: : if KEY value is found.
P3: : if KEY value is NOT found.
P4: : if KEY value is NOT found.