SECTION - 1

Q2

Ans In computer science, binary search also known as half-interval search, logarithmic search or binary chop, is a search algorithm that find position of a target value with in a sorted array. Binary search compares the target vale to the middle element of the array.

- Binary search runs in logrithmic time in the worst case, making O(log n) comparisons, where n is the number of elements in the array the O is Big O notation and log is the logarithm. Binary search is faster than linear seacch except for small arrays. However the array must be sorted first to be able to apply binary search.
- Binary search can be used to solve a wider range of Problem. such as finding the next-smallest or next-largest element in the array relative to the target even if it is absent from the array.
- The Binary search tree and B-tree data structures are based on binary search.

→ Examples of Binary are following :-

1) Algorithm :- Binary search work on sorted arrays. Binary search begins by comparing an element in the middle of the array with the target value. If the target value matched the element its position in the array is returned. if the target value is less than the element. the search continues in the lower half of the array. By doing this the algorithm eliminates the half in which the target value cannot lie in each iteration.

Given an array A of n element with values or records $A_0, A_1, A_2 \ldots\ldots, A_{n-1}$ sorted such that $A_0 \leq A_1 \leq A_2 \leq \ldots\ldots \leq A_{n-1}$.

a) Set L to 0 and R to n-1.

b) If $L < R$, the search terminates as Unsuccessful

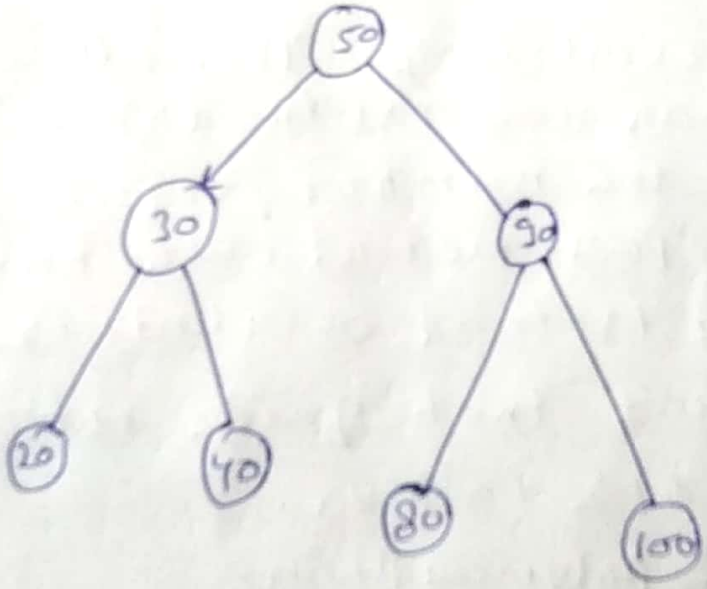
c) Set m (the position of the middle element) to the Floor of $\frac{L+R}{2}$ which is the greatest integer less than or equal to $\frac{L+R}{2}$.

d) if $A_m < T$, Set L to m+1.

e) Now $A_m = T$, the search is done, Return m.

2 Performance :- In terms of the number of comparisons. the middle element of the lower. The Performance of Binary Search can be analyzed by viewing the run of the procedure on a binary tree. The root node of the tree it the middle element of the array.

- In the worst case, binary search makes $\lfloor \log_2(n) + 1 \rfloor$ iterations of the comparison loop.
- where the $\lfloor \rfloor$ notation denotes the floor function that yields the greatest integer less than or equal to then argument, and $\log_2$ it the binary logarithm.



A Tree representing binary search.