

Name :- Vaibhav Kumar Chauhan

Father name :- Sharan Kumar

Admission no. + 19021507

Subject + Design & Analysis algo.

Subject code + TCS-505

Date + 7/9/21

Roll no. + 2014934

Ques 1 :-

a) Step 1 : Start

Step 2 : Initialize $lo = 0$ and $hi = n - 1$ where n is the length of array.

Step 3 : Run a loop while $(lo \leq hi)$. If it is false then go to Step 9.

Step 4 : $mid = lo + (hi - lo) / 2$

Step 5 : Check if $arr[mid] == x$ where x is the element to be searched. If the condition is true then return true, if condition is false then return to Step 6.

Step 6 : If $arr[mid] < x$. If condition is true then ~~return~~, otherwise go to Step 7. $lo = mid + 1$

Step 7 : If $arr[mid] > x$. If condition is true then ~~return~~.

Step 8 : Repeat the loop. $hi = mid - 1$

Step 9 : Stop.

Thanks!

⇒ Time

In binary search, the array gets divided by half at every iteration.

1st iteration length = n

2nd iteration length = $n/2$

⋮

k th iteration length = $n/2^k$

As after ' k ' division, the length of the array becomes 1.

$$\therefore n/2^k = 1$$

$$n = 2^k \text{ — (1)}$$

Taking log both side (1)

$$\log n = \log(2^k)$$

$$\underline{k = \log n}$$

Q.E.D.!

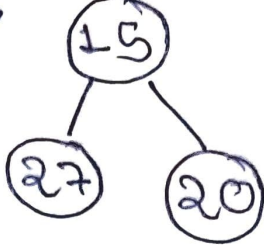
Ques 2 a) 20, 27, 15, 6, 19, 24, 72

i) 20 → 

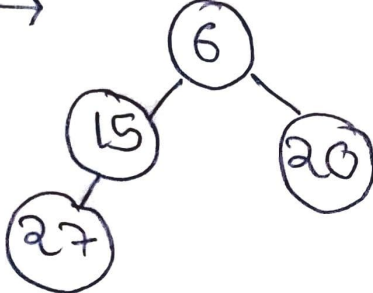
(no swap,
20 inserted)

ii) 27 → 

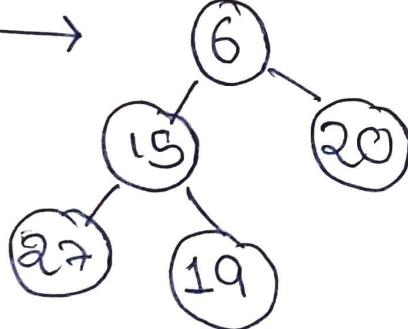
(no swap,
27 inserted)

iii) 15 → 

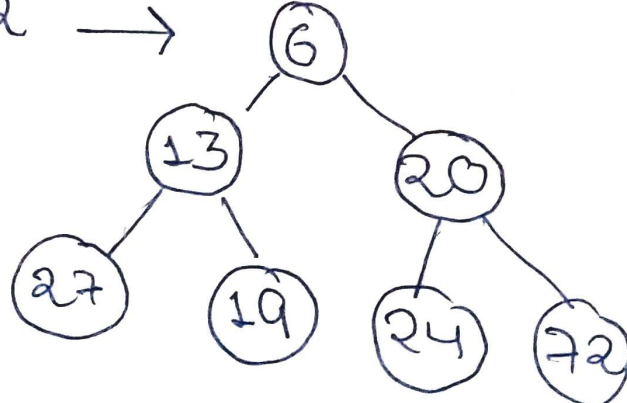
(15 inserted)
20 swapped

iv) 6 → 

6 inserted
27 swapped

v) 19 → 

19 inserted
no swap

vi) 24, 72 → 

24, 72
inserted,
no. swap

Thank!