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University Roll No. - 2015147

Subject - Design And Analysis Of Algorithm

Subject Code - TCS505

Sem - 5th

Course - B.Tech (DS & AI)

Type - Regular

Akshay

Q1.)

(a) step 1: Start

step 2: Initialize beg = 0 & end = n-1, where 'n' is length of array.

step 3: Run a loop while (beg <= end).
If beg is not less than equal to end go to step 9.

step 4: mid = beg + (end-beg)/2

step 5: Check if (arr[mid] == x).
where x = element to be searched
arr = array.
If true return True else go to step 6:

step 6: If (arr[mid] < x). If truee increment beg by 1 else go to step 7.

step 7: If (arr[mid] > x) . If true end is incremented by 1. ~~else~~

step 8: Repeat loop

step 9: stop

Keshav

Time complexity of Binary search:

$T(n) = T(n/2) + c$

At iteration 1 : length of array $= n$

At iteration 2 : length of array $= n/2$

At iteration 3 : length of array $= (n/2)/2$

Lets suppose after K iterations length of array becomes 1.

Then,

at Iteration K

Length of array $= n/2^K$

Now,

$n/2^K = 1$

$n = 2^K$

$$\boxed{K = \log_2(n)}$$

∴ Time complexity $= \log(n)$

Space complexity $= O(1)$ — As no additional space is used.

Akshay

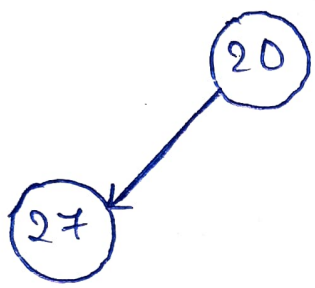
2 (a)

Order of keys insertion :-

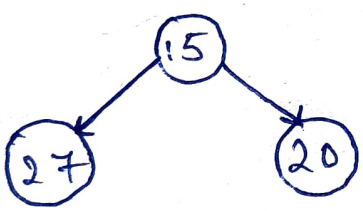
20, 27, 15, 6, 19, 24, 72

(i) 20

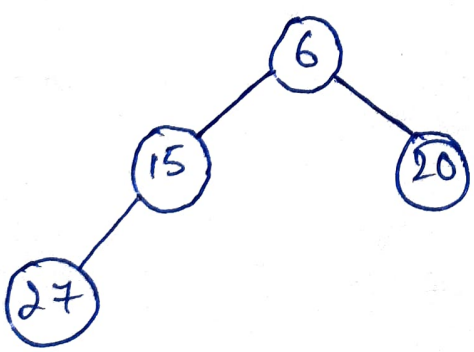
(ii) 20, 27



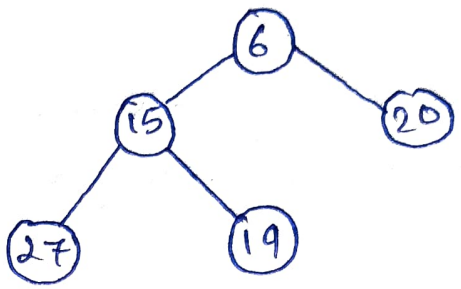
(iii) 20, 27, 15



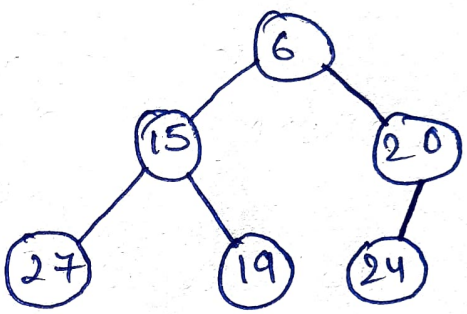
(iv) 20, 27, 15, 6



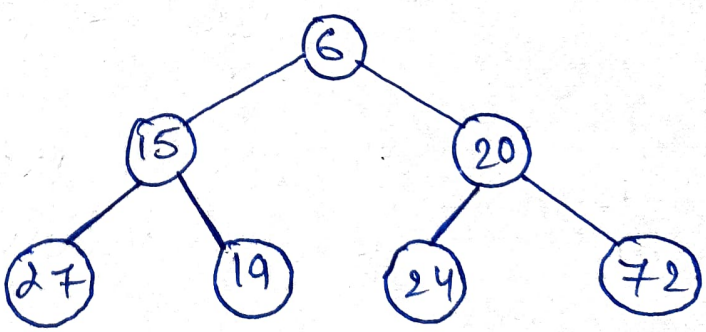
(v) 20, 27, 15, 6, 19



(vi) 20, 27, 15, 6, 19, 24



(vii) 20, 27, 15, 6, 19, 24, 72



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