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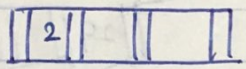
Assignment_3 : Homework_ch 11

11.3) Construct a B+ tree for the following set of key values: (2, 3, 5, 7, 11, 17, 19, 23, 29, 31)
Assume that the tree is initially empty & values are added in ascending order. Construct B+ trees for the cases where the number of pointers that will fit in one node as follows:

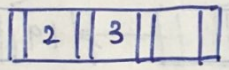
→ a) four b) six c) eight

The following were generated by inserting values into the B+ tree in ascending order. A node (other than root) was never allowed to have fewer than $(\frac{n}{2})$ values | pointer.

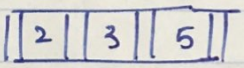
Insert 2 :



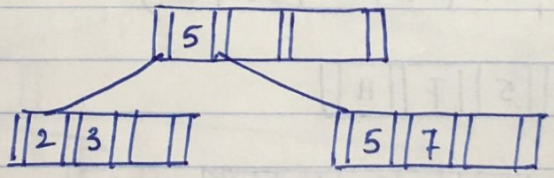
Insert 3 :



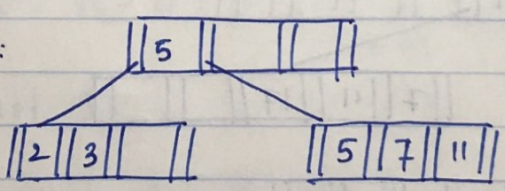
insert 5 :



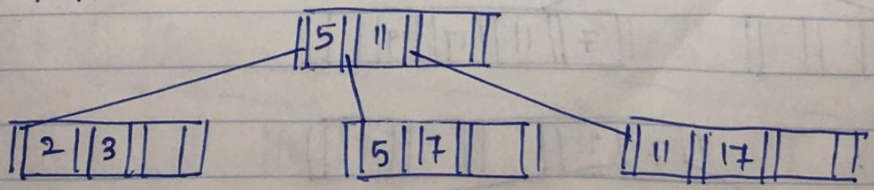
insert 7 :



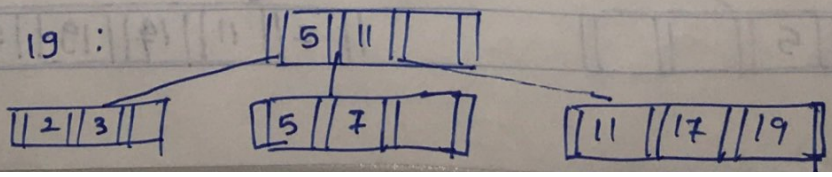
insert 11 :



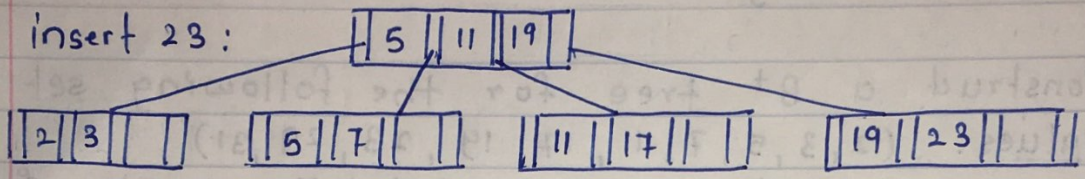
insert 17 :



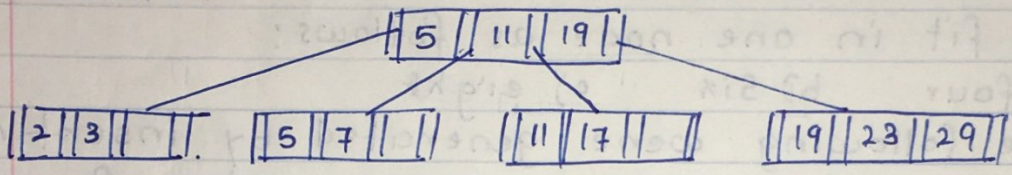
insert 19 :



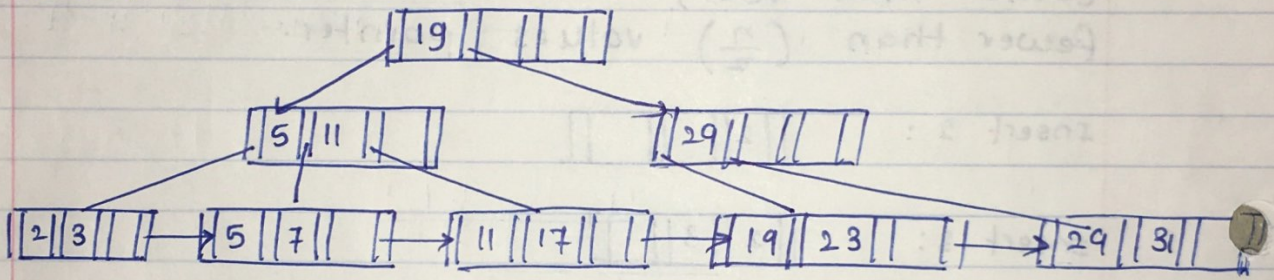
insert 23 :



insert 29 :



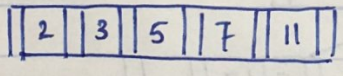
insert 31 :



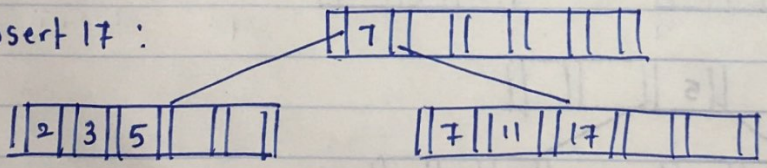
→ b) Six :- n = 6

(2, 3, 5, 7, 11, 17, 19, 23, 29, 31)

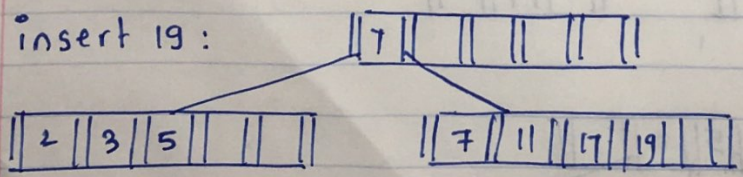
insert :



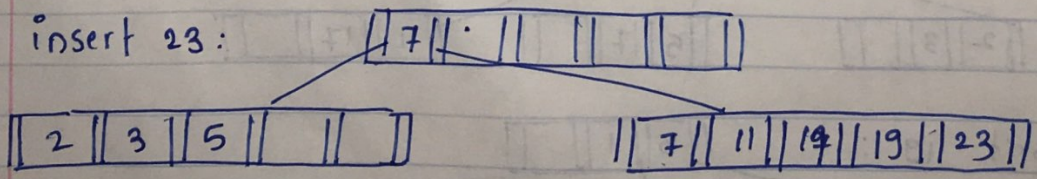
insert 17 :



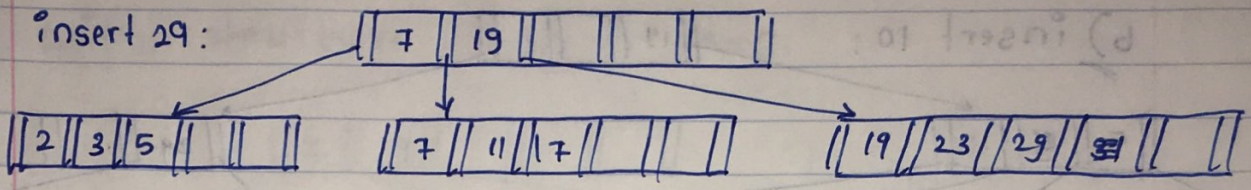
insert 19 :



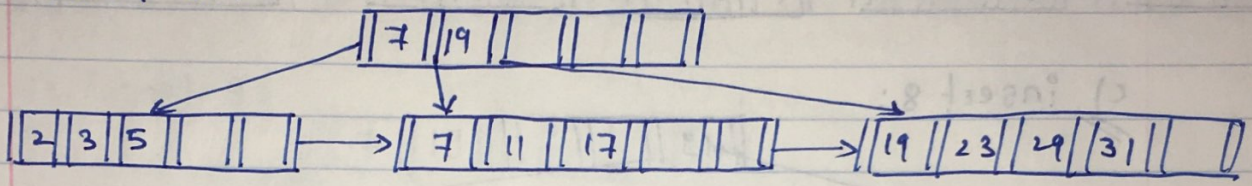
insert 23 :



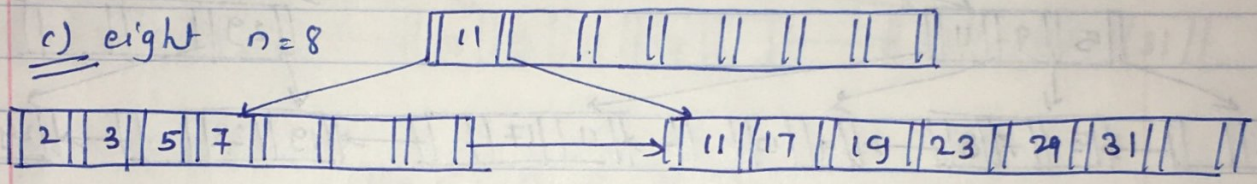
insert 29:



insert 31:

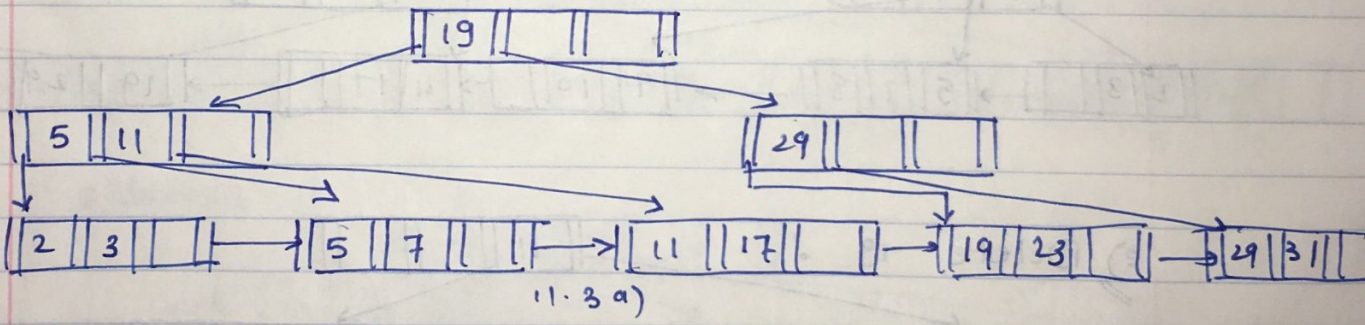


→ c) eight n=8



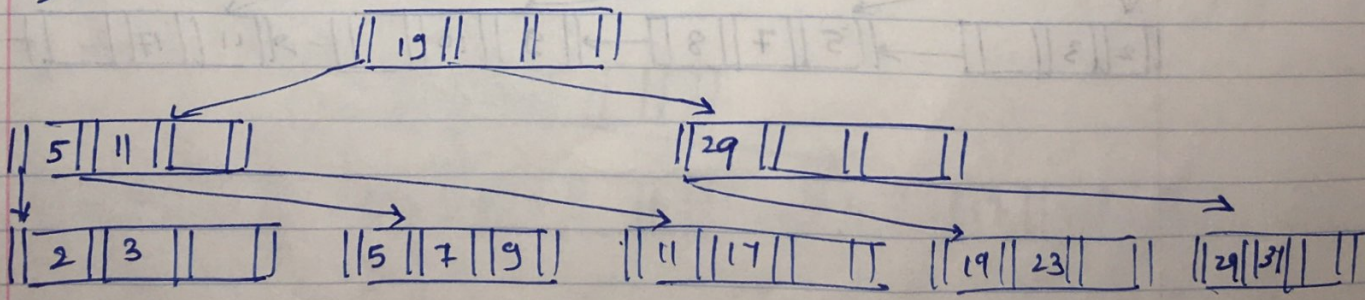
11.4) For each B+ tree from exercise 11.3, show the form of tree after each of the following series of operations.

→ For 11.3 a) → structure for 11.3 a)

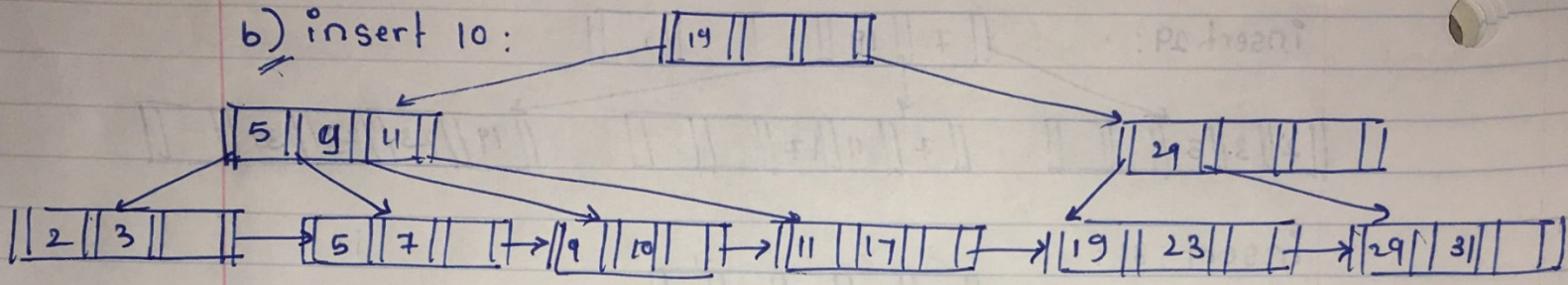


11.3 a)

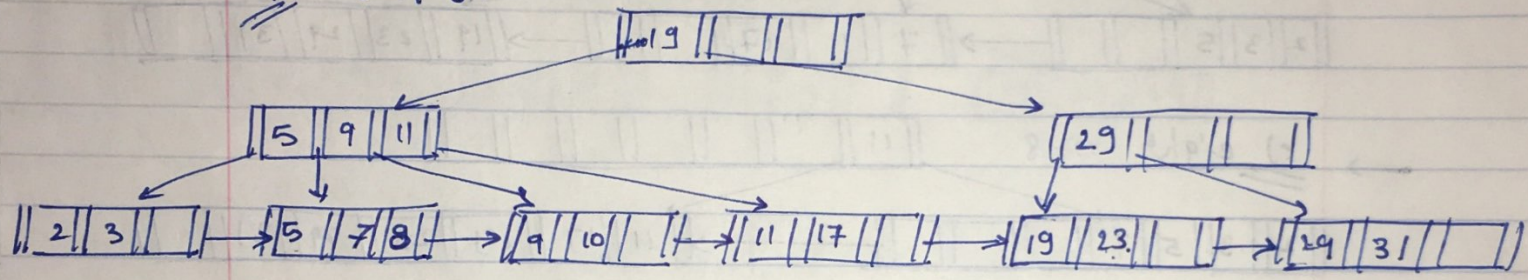
a) insert 9:



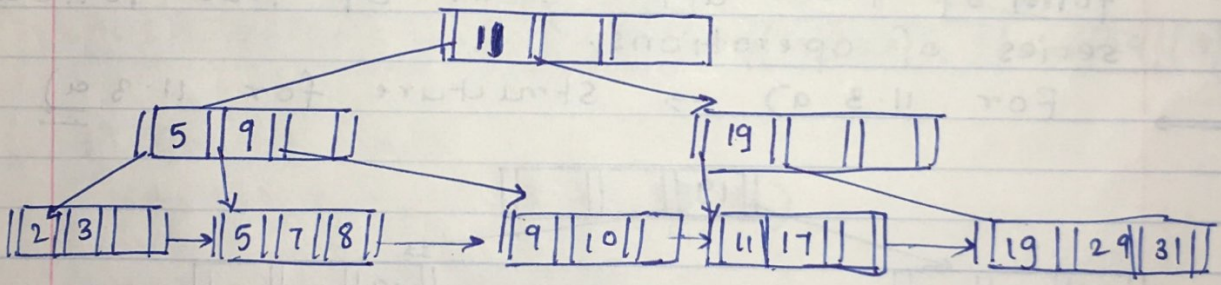
b) insert 10 :



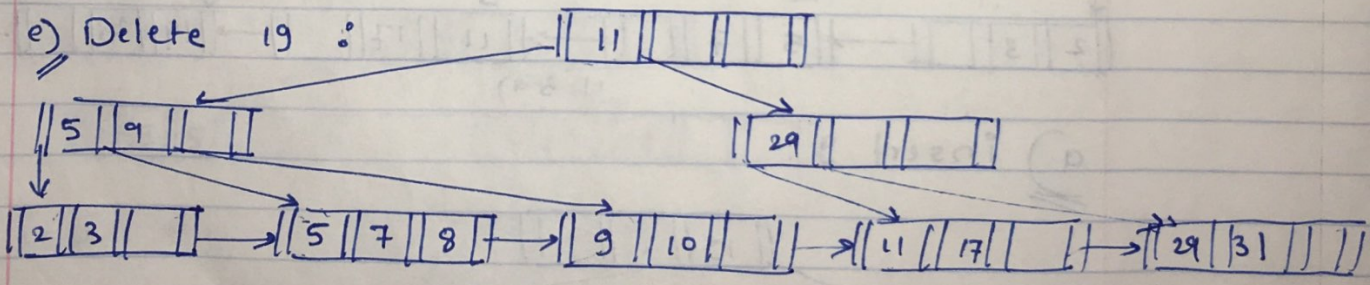
c) insert 8 :



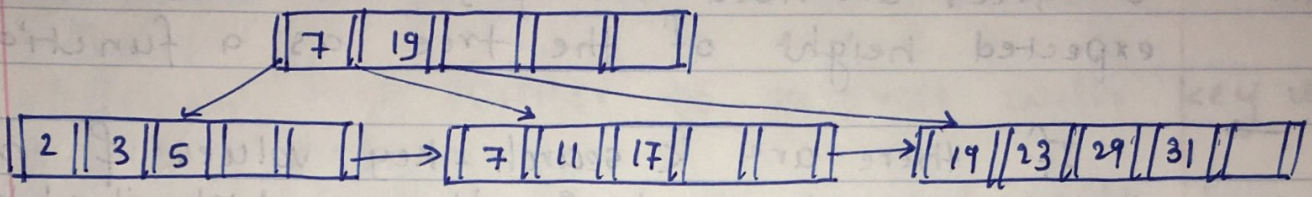
d) ~~insert~~ Delete 23 :



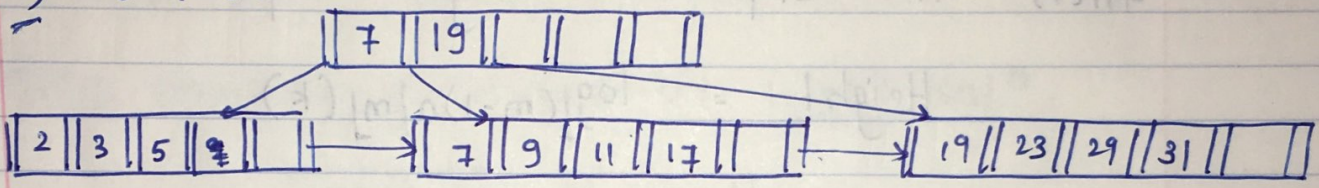
e) Delete 19 :



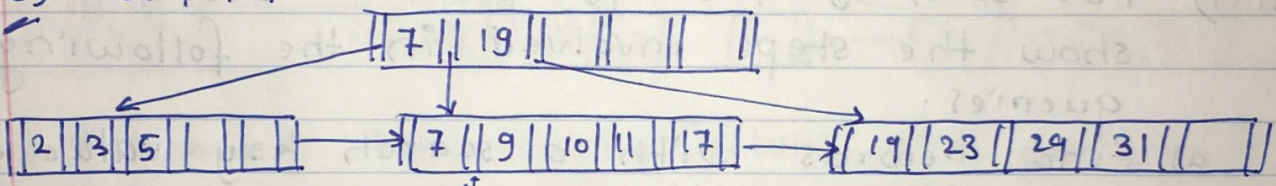
(11.3) b) with structure 11.3 b n=6



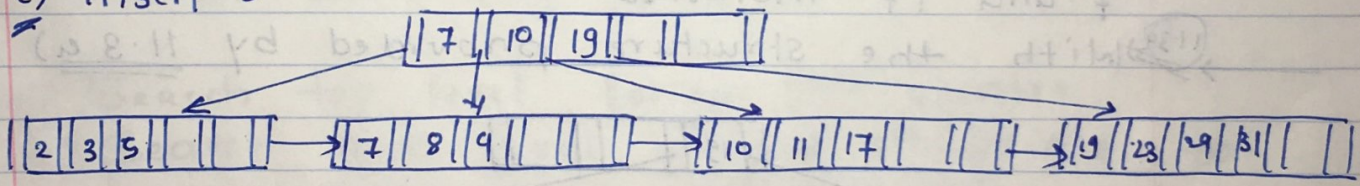
(11.4) b) a) insert 9:



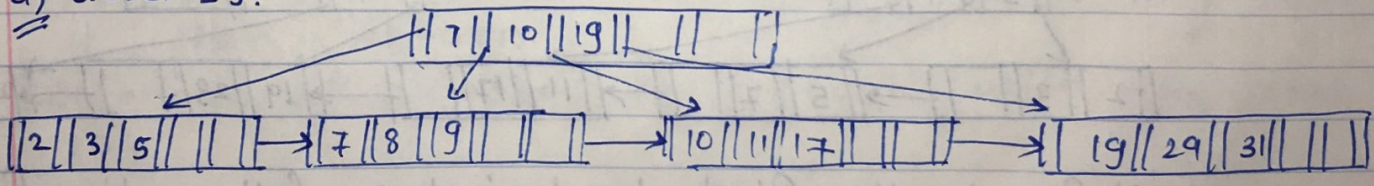
b) insert 10:



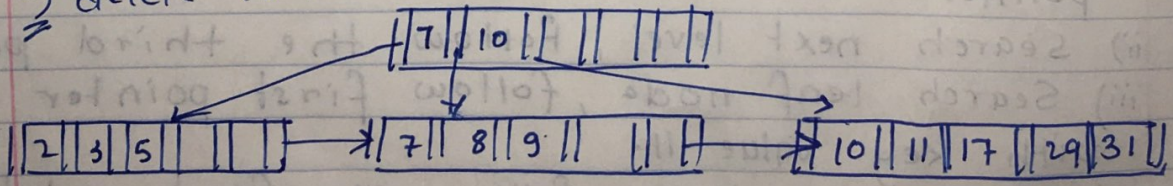
c) insert 8:



d) delete 23:



e) delete 19:



11.5) Consider the modified redistribution scheme for B^+ trees described on page 501. What is the expected height of the tree as a function of n?

→ If there are K search-key values & m-1 siblings are involved in the redistribution, then the expected height of the tree is:

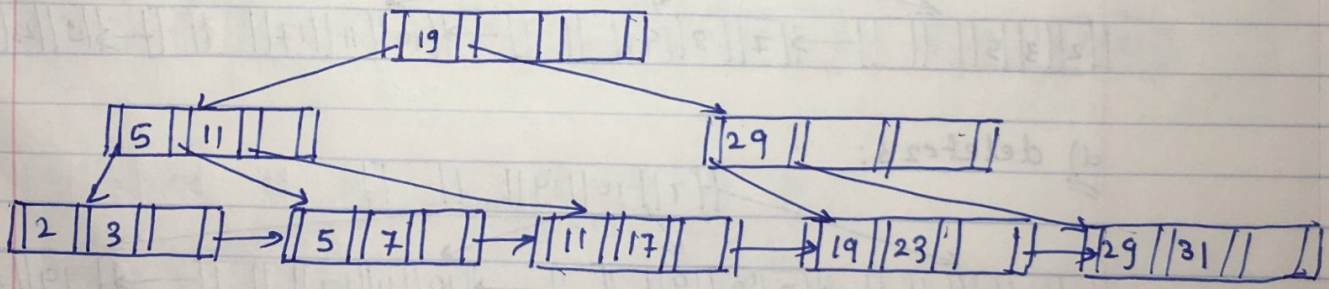
$$\text{Height} = \log_{\lfloor (m-1)n/m \rfloor}(k)$$

11.17) For each B^+ tree for practice exercise 11.3 a), b), show the steps involved in the following queries.

a) Find records with a search key value of 11.

b) Find records with a search key value bet'n 7 and 17 inclusive.

11.3a) With the structure provided by 11.3 a) soln



→ a) i) Search the first level index; follow the first pointer.

ii) Search next level, follow the third pointer.

iii) Search leaf node, follow first pointer to records with key value 11.

→ b) i) Search top index, follow the first pointer.

ii) Search next level, follow second pointer.

iii) Search third level, follow second pointer to records with key value 7, & after accessing

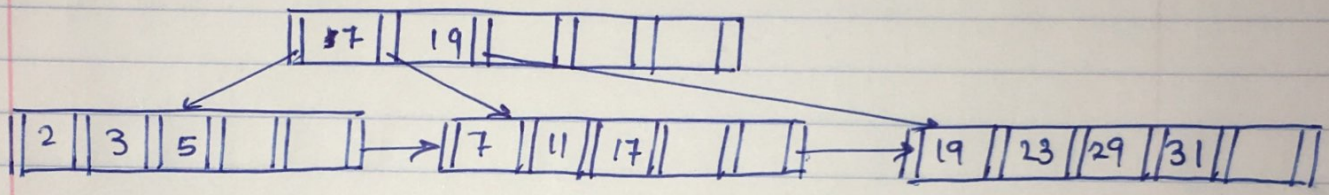
~~4.7~~) them, return to leaf node.

iv) Follow 4th pointer to next leaf block in the chain.

v) Follow first pointer to records with key value 11, then return.

vi) Follow 2nd pointer to record with key value 17.

11.3b) With structure provided by 11.3b) soln.



a) → i) Search top level, follow 2nd pointer.

ii) Search next level, follow 2nd pointer to records with key value 11.

b) → i) Search top level, follow 2nd pointer.

ii) Search next level, follow 1st pointer to records with key value 7, then return.

iii) Follow 2nd pointer to record with key value 11, then return.

iv) Follow 3rd pointer, to record with key value 17.