

**Question 5** (10 marks)

Consider the following two arrays as the result after the XBW-Transform linearizes the tree T:

```
S[last] = 10010100101111011
S[alpha] = ABCBabaBCaBaCaaba
```

Assume all internal nodes of T are in uppercase and its leaf nodes are in lowercase. Derive and draw the original tree T. Show any steps involved.

**Instructions:**

- Save your answer and drawing in a file called q5.pdf in PDF format.

From Slast and Salpha, we can derive the C table which is

A : 2  
B : 7  
C : 14

Then we can have a better view at Slast and S<sub>2</sub>:

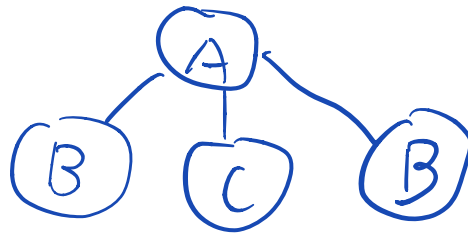
	Slast	S <sub>2</sub>
1	1	A
2	0	B
3	0	C
4	1	B
5	0	a
6	1	b
7	0	a
8	0	B
9	1	C
.	.	.

10	0	A	}	B
11	1	B		
12	1	a		
13	1	C		
<hr/>				
14	1	a	}	C.
15	0	a		
16	1	b		
17	1	a.		

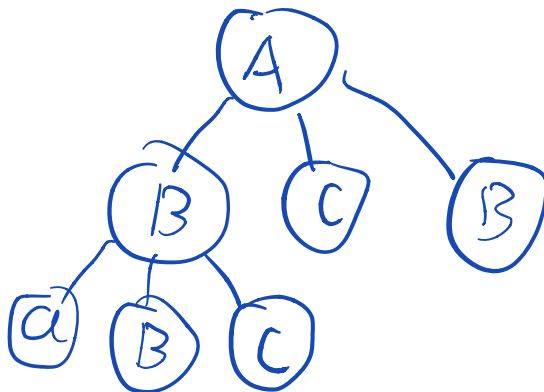
① We know A is the root node;



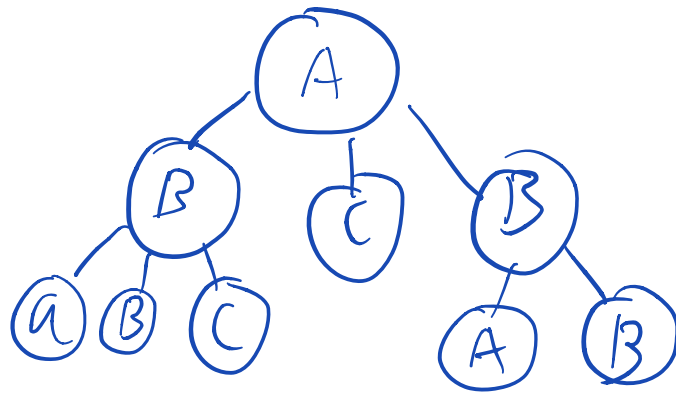
and index 2-4 are its three child,



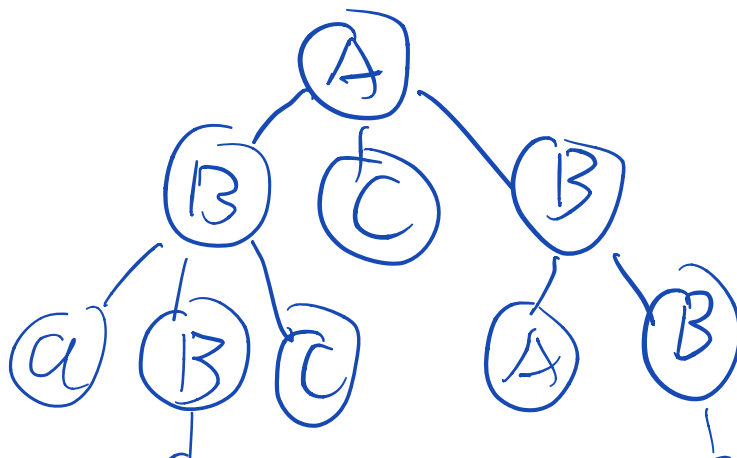
② the left hand B's child can be derived from index 7-9.



also the right B's child can  
be derived from index 10-11



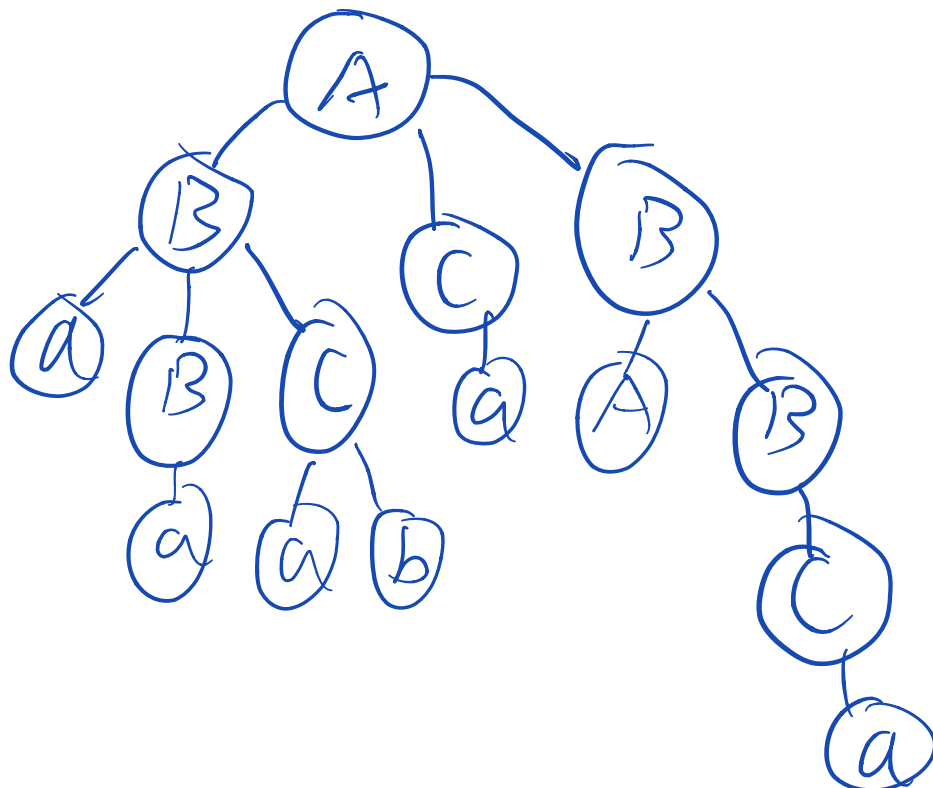
as two more B added,  
we can get each B's child,  
from index 12, 13



(a)

(c)

(3) The top C's child  
is index/4, the C-B-A's  
C's children is 15-16  
the longest way C-B-A's  
C's child is 17



④ We have index 5, 6 not added, we add them under the A-B-A's A

