Quiz-3 (A-B-E): Design and Analysis of Algorithms (Spring-2024)

SOLUTION

1) Compute the Prefix function of pattern P = aabacabaab using Knuth-Morris-Pratt Method for String matching. [5 Marks]

q	**a**	**a**	**b**	**a**	**c**	**a**	**b**	**a**	**a**	**b**
π[q]	0	1	0	1	0	1	0	1	2	3

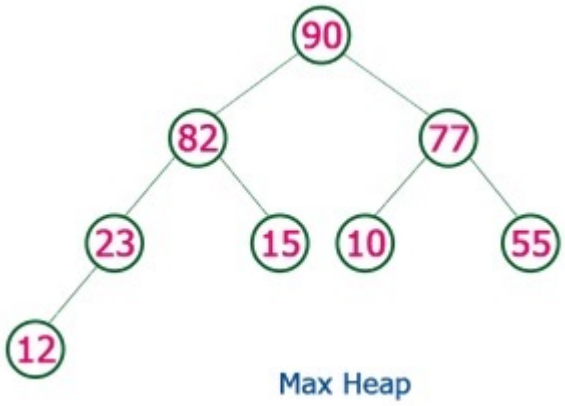
2) Suppose that all characters in the pattern *P* are different. Show how to accelerate naive Algorithm to run in time $O(n)$ on an n-character text T by writing the algorithm (in pseudocode form). [5 Marks]

```
Accelerated_naive_algo(T,P,n,m)
BEGIN
        s ← 0
        WHILE s ≤ n-m DO
                FOR (j : 1 to m) DO
                        IF P[j] ≠ T[s+1] THEN
                                break
                        END IF

                        IF j = m THEN
                                PRNT "Pattern occurs at shift : ", s-m
                        END IF

                        s ← s + 1
                END FOR
        END WHILE
END
```

3) Show the tracing of Heap Sort using the following heap. Show all steps. [10 Marks]



Max Heap

Please consult the lecture slides