



I SEMESTER M. TECH (CSE/CSIS)

MID SEMESTER EXAMINATION, Oct 2023

SUBJECT: ADVANCED DATA STRUCTURES & ALGORITHMS (CSE 5113)

REVISED CREDIT SYSTEM

Date: 10/10/2023

Time: 2 Hours

MAX. MARKS: 30

Note: Answer ALL the questions.

- 1) i) Compare asymptotic analysis with amortized analysis [2M]
 ii) Compare different amortized analysis methods with the help of an example [3M]
- 2) Construct the B-Tree with degree 3 with the following keys in order of their arrival 7, 2, 15, 18, 9, 100, 150, 17, 1, 11, 120, 20, 95, 35, 92, 93, 12, 300, 135, 210, 8, 5, 111, 112, 155, 118, 350. Delete elements 7, 2, and 15. [5M]
- 3) Analyse the amortized cost (Aggregate method) of binary counter which supports both increment and decrement operations (example: 0, 1, 2, 1, 2, 3,). Identify the amortized cost (Accounting method) of the algorithms given in Figure 3. [5M]

```

INCREMENT(P, N):
  i ← 0
  while P[i] = 1
    P[i] ← 0
    i ← i + 1
  if N[i] = 1
    N[i] ← 0
  else
    P[i] ← 1
  
```

```

DECREMENT(P, N):
  i ← 0
  while N[i] = 1
    N[i] ← 0
    i ← i + 1
  if P[i] = 1
    P[i] ← 0
  else
    N[i] ← 1
  
```

Figure 3. Algorithm

- 4) Delete the key 26 from the following Binomial heap (Figure 4) by clearly showing all the stages [5M]

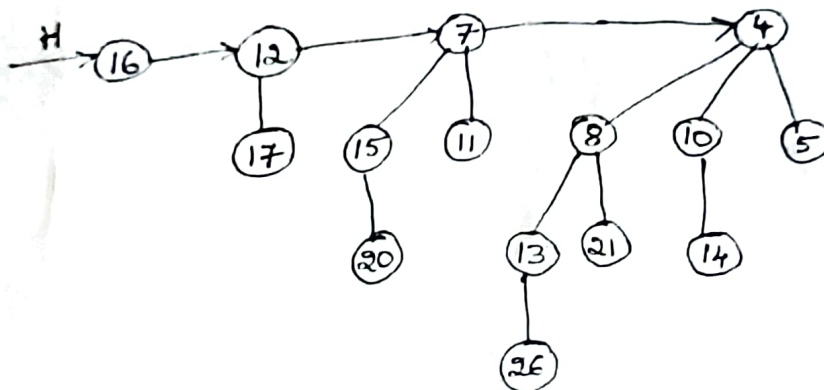


Figure 4.

- 5). Extract the minimum key and do consolidation for the Fibonacci heap given in Figure 5. by showing all the steps [18, 39, and 26 are marked nodes]

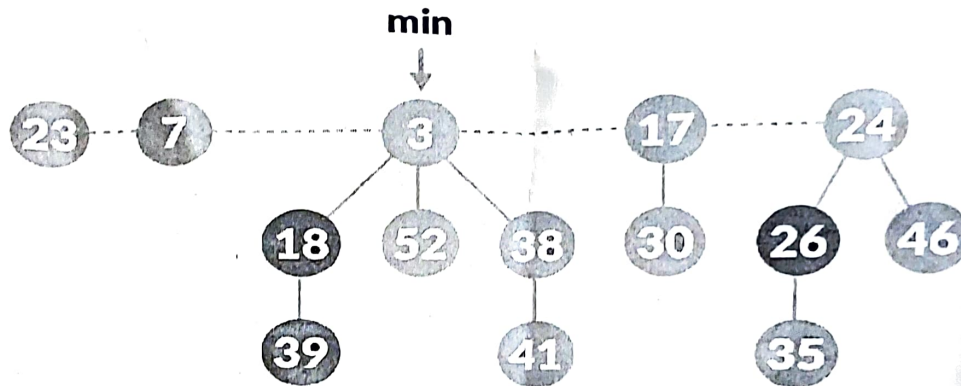


Figure 5.

[5M]

- 6) Given the list 6, 18, 35, 55, 59, 21, 30, 52
 i) Construct the Binomial heap
 ii) Construct the Fibonacci heap

[5M]