MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

I SEMESTER M. TECH (CSE/CSIS)

MID SEMESTER EXAMINATION, Oct 2024

SUBJECT: ADVANCED DATA STRUCTURES & ALGORITHMS (CSE 5113)

REVISED CREDIT SYSTEM

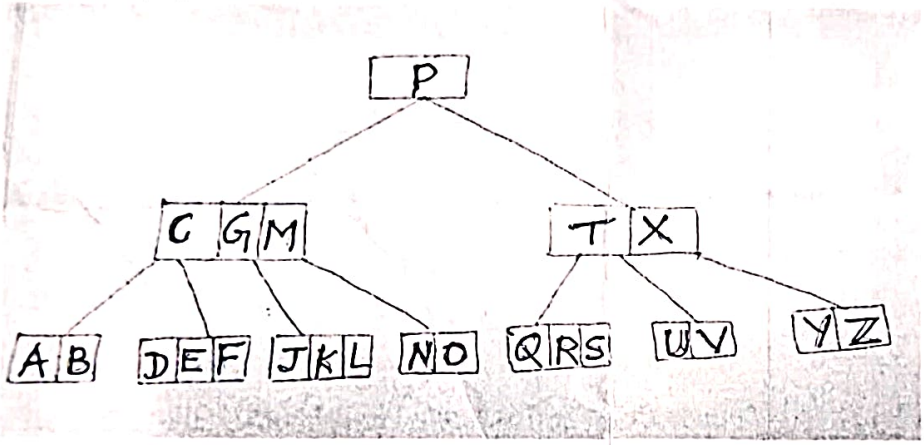
Date: 08/10/2024 **Time: 90 Minutes** **MAX. MARKS: 30**

Note: Answer ALL the questions.

1) Explain the aggregate method for amortized analysis. Also, illustrate it in detail with the operations on stack with multi pop and binary counter. **[5M]**

2) List the properties of the B-Tree. Construct the B-Tree with the keys **50, 30, 21, 90, 10, 13, 20, 70, 25, 92, 80, 93, 23, 28** by successive insertion in one pass method with degree t=2. **[5M]**

3) Explain the various rules governing the deletion of nodes in a B-Tree. Also, consecutively delete the keys **F, M, G, S,** and **B** from the following B-Tree (Figure 3.) with degree t=3 and show the tree after each deletion.



[5M]

Figure 3.

4) Construct Binomial heap after deleting key **28** from the following Binomial heap (Figure 4.), showing all the stages

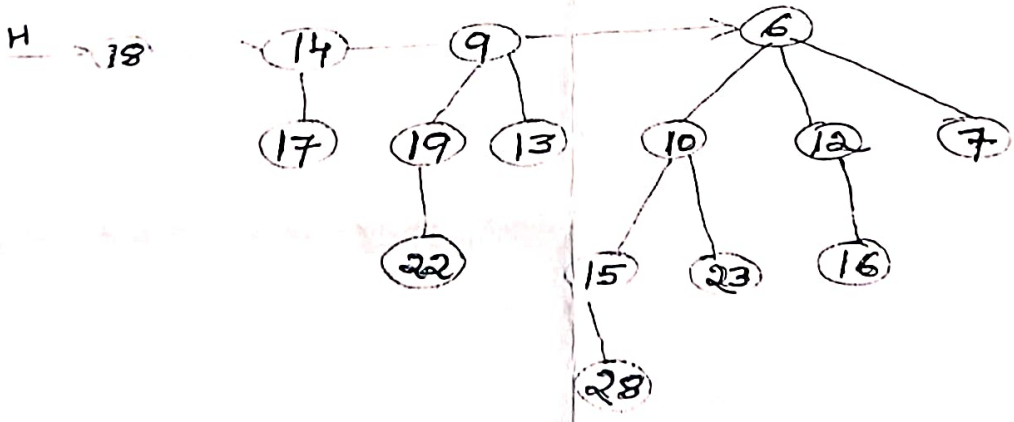


Figure 4. **[5M]**

5). Clearly showing all the steps, extract the minimum key and do consolidation for the Fibonacci heap given in Figure 5. [21, 42, and 29 are marked nodes]

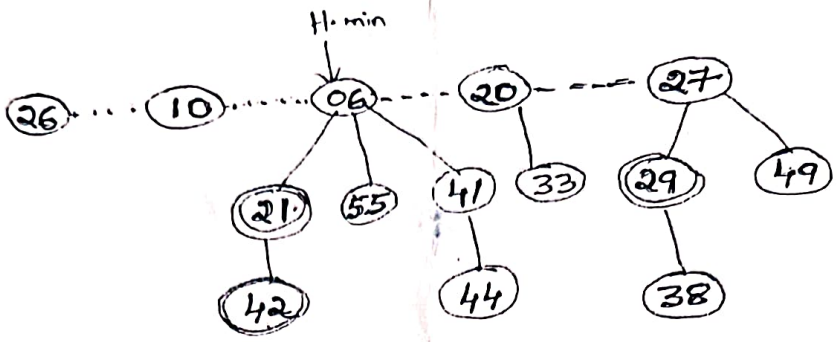


Figure 5.

[5M]

6) Given the list: 10, 20, 30, 40, 50, 60, 70, 80, 90
   i) Construct the Binomial heap
   ii) Construct the Fibonacci heap [5M]