1. Ans.

![Figure 1: Binomial heaps with 21 nodes.](image)

2. Ans. For this question, there are various correct answers. Figures 2 to 6 show one possible sequence of the change in the Fibonacci heaps after the five required operations.

![Figure 2: After Decrease-Key 55 to 3.](image)

![Figure 3: After Extract-Min.](image)

![Figure 4: After Insert 18.](image)

![Figure 5: After Decrease-Key 36 to 12.](image)
Figure 6: After Extract-Min.

3. (a) Ans.

Figure 7: After Union($a, x$).

Figure 8: After Find($y$).

(b) Ans.

Figure 9: After Union($a, x$).

Figure 10: After Find($y$).