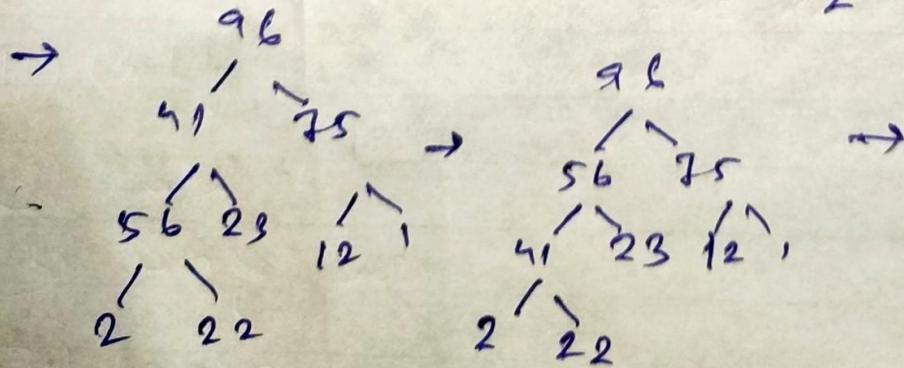
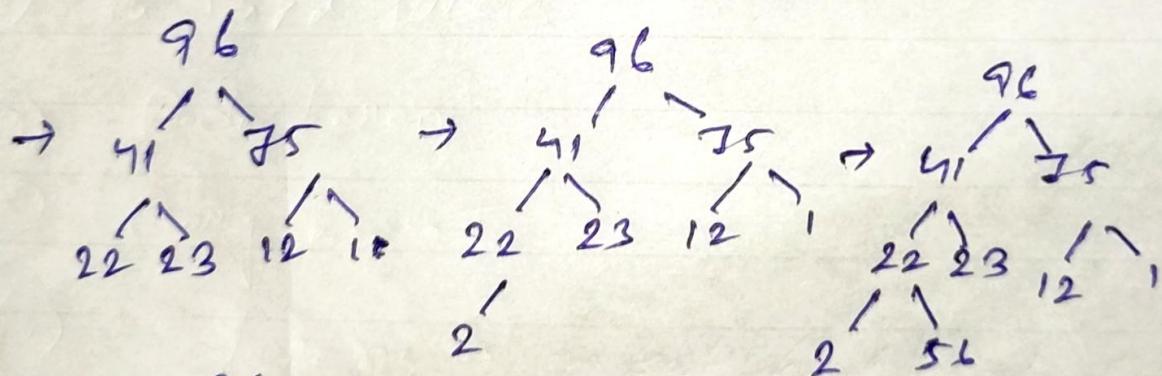
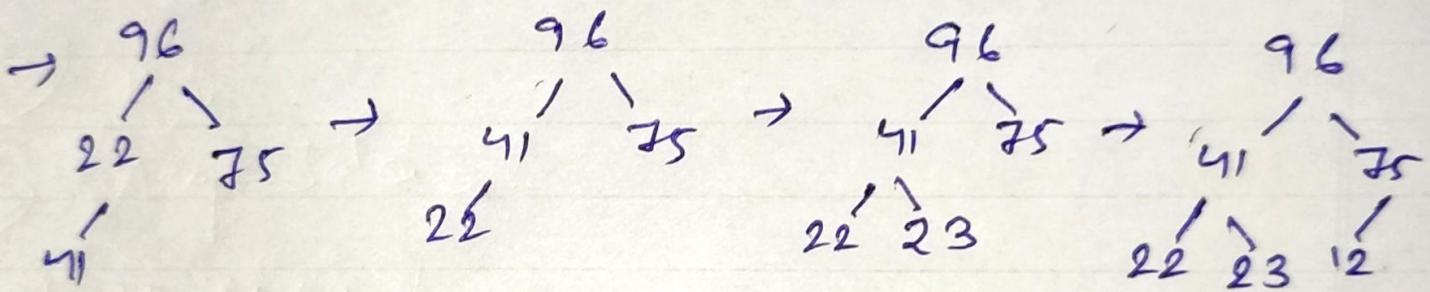
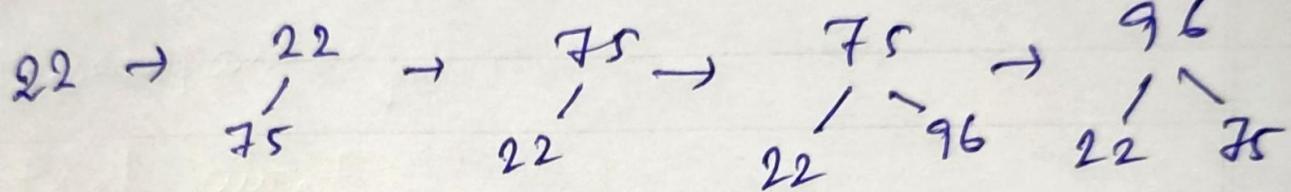


①

D 22 75 96 41 23 12 1 2 56

Max



②

20 min

$$22 \rightarrow \begin{matrix} & 22 \\ & / \quad \backslash \\ 75 & & 75 \end{matrix} \rightarrow \begin{matrix} & 22 \\ & / \quad \backslash \\ 75 & 96 \end{matrix} \rightarrow \begin{matrix} & 22 \\ & / \quad \backslash \\ 75 & 91 \end{matrix}$$

$$\rightarrow \begin{matrix} & 22 \\ & / \quad \backslash \\ 41 & 96 \end{matrix} \rightarrow \begin{matrix} & 22 \\ & / \quad \backslash \\ 41 & 96 \end{matrix} \rightarrow \begin{matrix} & 41 \\ & / \quad \backslash \\ 22 & 96 \end{matrix} \rightarrow \begin{matrix} & 22 \\ & / \quad \backslash \\ 23 & 96 \end{matrix} \rightarrow \begin{matrix} & 22 \\ & / \quad \backslash \\ 23 & 96 \end{matrix}$$

$$\begin{matrix} & 22 \\ & / \quad \backslash \\ 75 & 23 \end{matrix} \quad \begin{matrix} & 22 \\ & / \quad \backslash \\ 75 & 41 \end{matrix} \quad \begin{matrix} & 22 \\ & / \quad \backslash \\ 75 & 41 \end{matrix} \quad \begin{matrix} & 22 \\ & / \quad \backslash \\ 75 & 41, 12 \end{matrix}$$

$$\rightarrow \begin{matrix} & 22 \\ & / \quad \backslash \\ 23 & 12 \\ & / \quad \backslash \\ 75 & 41 \end{matrix} \rightarrow \begin{matrix} & 12 \\ & / \quad \backslash \\ 23 & 22 \\ & / \quad \backslash \\ 75 & 41 \end{matrix} \rightarrow \begin{matrix} & 12 \\ & / \quad \backslash \\ 23 & 22 \\ & / \quad \backslash \\ 75 & 41, 96 \end{matrix}$$

$$\begin{matrix} & 12 \\ & / \quad \backslash \\ 75 & 41, 96 \end{matrix} \quad \begin{matrix} & 12 \\ & / \quad \backslash \\ 75 & 41, 96 \end{matrix}$$

$$\rightarrow \begin{matrix} & 12 \\ & / \quad \backslash \\ 23 & 1 \\ & / \quad \backslash \\ 75 & 41, 96, 22 \end{matrix} \rightarrow \begin{matrix} & 1 \\ & / \quad \backslash \\ 23 & 41 \\ & / \quad \backslash \\ 75 & 96, 22 \end{matrix} \rightarrow \begin{matrix} & 1 \\ & / \quad \backslash \\ 23 & 12 \\ & / \quad \backslash \\ 45 & 41, 96, 22 \end{matrix}$$

$$\rightarrow \begin{matrix} & 1 \\ & / \quad \backslash \\ 23 & 12 \\ & / \quad \backslash \\ 2 & 41, 96, 22 \end{matrix} \rightarrow \begin{matrix} & 1 \\ & / \quad \backslash \\ 2 & 12 \\ & / \quad \backslash \\ 23 & 41, 96, 22 \end{matrix}$$

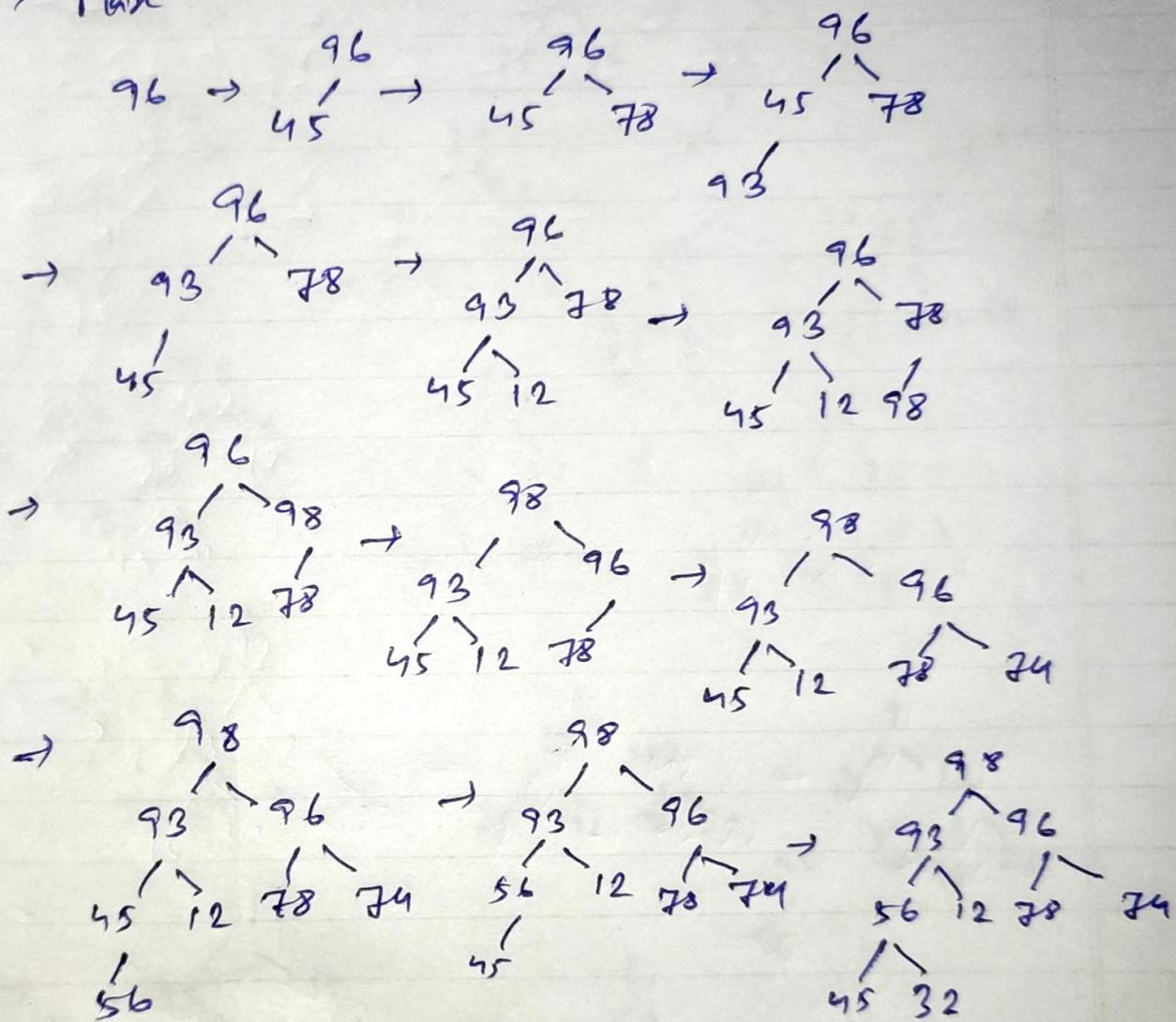
$$\begin{matrix} & 1 \\ & / \quad \backslash \\ 75 & \end{matrix} \quad \begin{matrix} & 1 \\ & / \quad \backslash \\ 75 & \end{matrix}$$

⑤

96 ~~78~~ 45 78 93 12 98 74 56 32

2)

Max



5

Min

$$96 \rightarrow \begin{matrix} 96 \\ 45 \end{matrix} \rightarrow \begin{matrix} 95 \\ 76 \end{matrix} \rightarrow \begin{matrix} 95 \\ 78 \end{matrix} \rightarrow \begin{matrix} 95 \\ 78 \end{matrix}$$

$$\rightarrow \begin{array}{c} 45 \\ / \quad \backslash \\ 93 \quad 78 \end{array} \rightarrow \begin{array}{c} 45 \\ / \quad \backslash \\ 93 \quad 78 \end{array} \rightarrow \begin{array}{c} 93 \\ / \quad \backslash \\ 45 \quad 12 \\ / \quad \backslash \\ 96 \quad 78 \\ / \quad \backslash \\ 96 \quad 93 \end{array}$$

$$\begin{array}{ccccccc}
 & 12 & & 12 & & 12 & \\
 & | & & | & & | & \\
 45 & & 45 & & 45 & & 45 \\
 & \backslash & & \backslash & & \backslash & & \backslash \\
 & 78 & & 78 & & 78 & & 78 \\
 & & & & & & & \\
 96 & 93 & & 96 & 93 & 98 & & 96 \\
 & & & & & & & \\
 & 12 & & 12 & & 12 & \\
 & | & & | & & | & \\
 45 & & 45 & & 45 & & 45 \\
 & \backslash & & \backslash & & \backslash & & \backslash \\
 & 78 & & 78 & & 78 & & 78 \\
 & & & & & & & \\
 96 & 93 & 98 & & 96 & 93 & 98 & \\
 & & & & & & & \\
 & 12 & & 12 & & 12 & \\
 & | & & | & & | & \\
 45 & & 45 & & 45 & & 45 \\
 & \backslash & & \backslash & & \backslash & & \backslash \\
 & 24 & & 24 & & 24 & & 24 \\
 & & & & & & & \\
 96 & 93 & 98 & & 96 & 93 & 98 & \\
 & & & & & & & \\
 & 12 & & 12 & & 12 & \\
 & | & & | & & | & \\
 45 & & 45 & & 45 & & 45 \\
 & \backslash & & \backslash & & \backslash & & \backslash \\
 & 28 & & 28 & & 28 & & 28
 \end{array}$$

96

```

graph TD
    12[12] --> 45[45]
    12 --> 74[74]
    45 --> 32[32]
    45 --> 93[93]
    74 --> 98[98]
    74 --> 78[78]
    98 --> 96[96]
    98 --> 56[56]

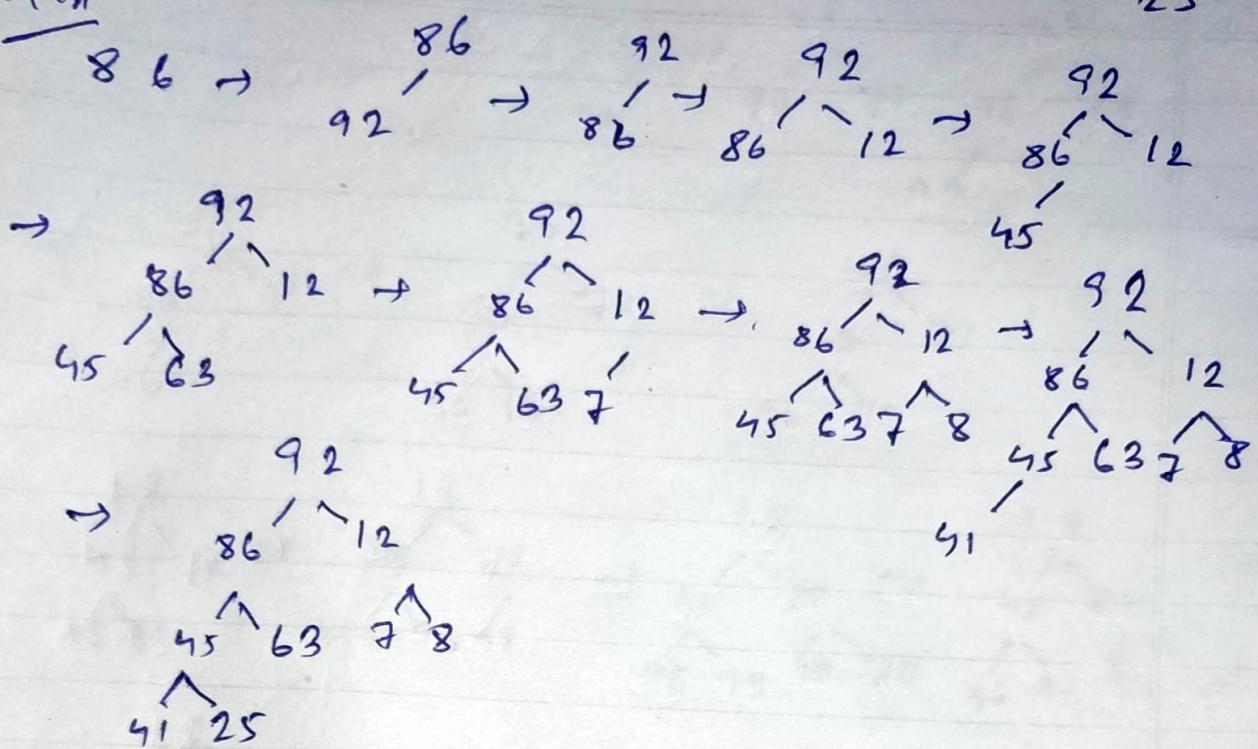
    72[72] --> 32[32]
    72 --> 74[74]
    32 --> 45[45]
    32 --> 93[93]
    74 --> 98[98]
    74 --> 78[78]
    98 --> 96[96]
    98 --> 56[56]
  
```

3)

(5)

Max

86 92 12 45 63 7 8 41 25

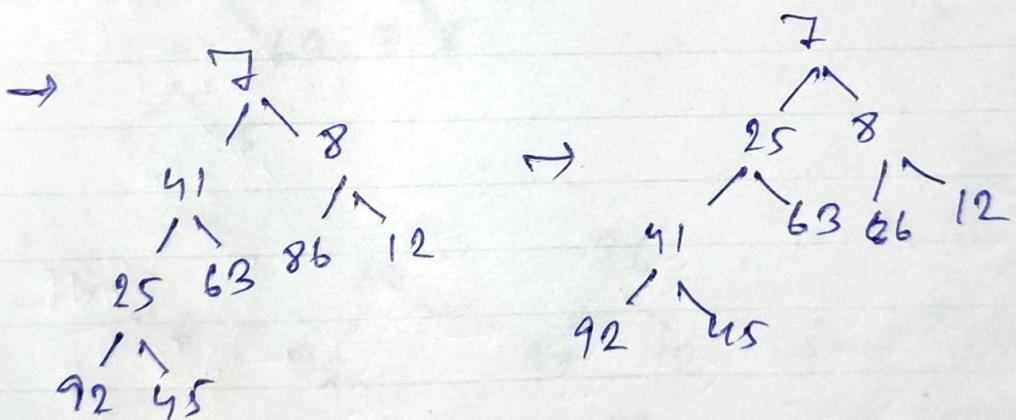
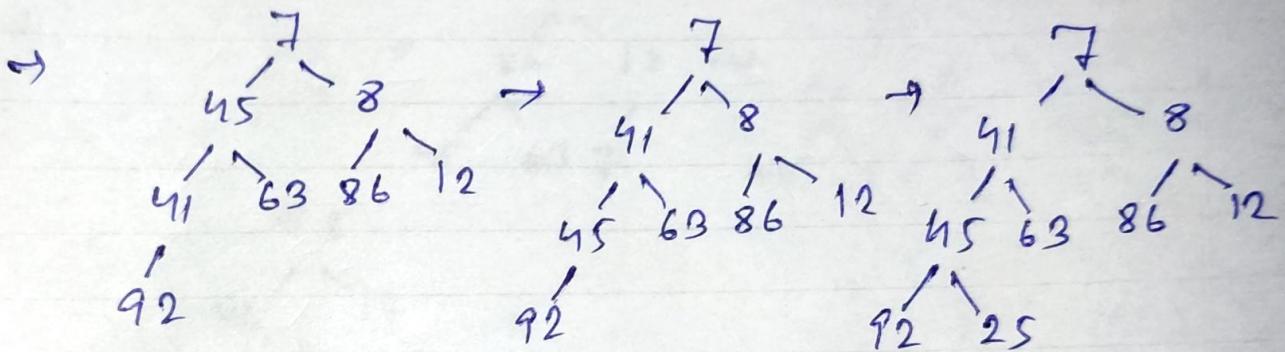
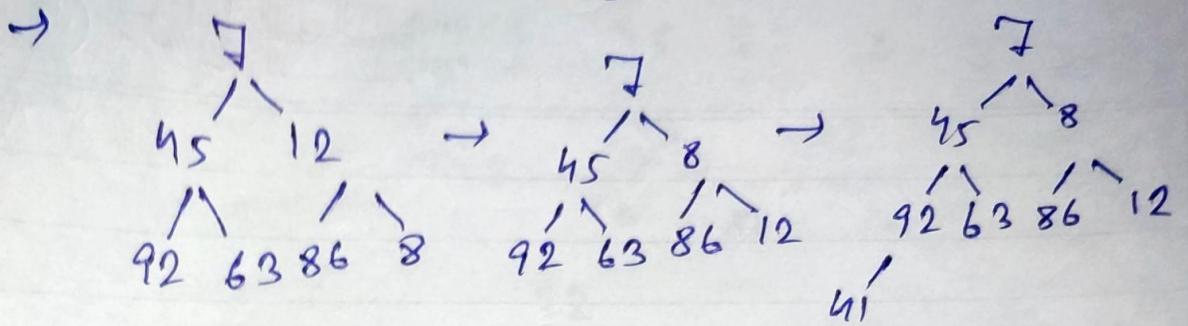
Min

86 → 86 → 86 → 12 → 12 → 86

→ 12 → 12 → 12 → 45 → 45 → 86

→ 12 → 12 → 7 → 45 → 45 → 12

⑥



⑦

45 63 45 17 86 95 42 31 20

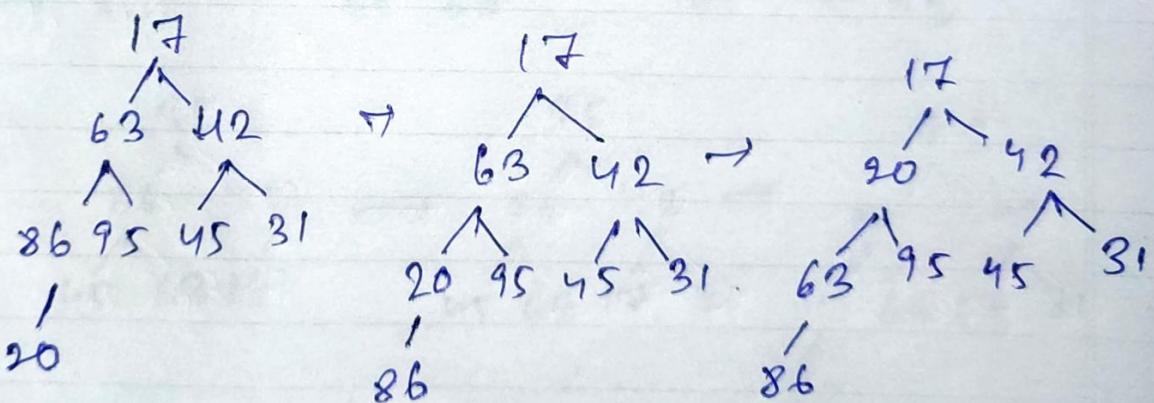
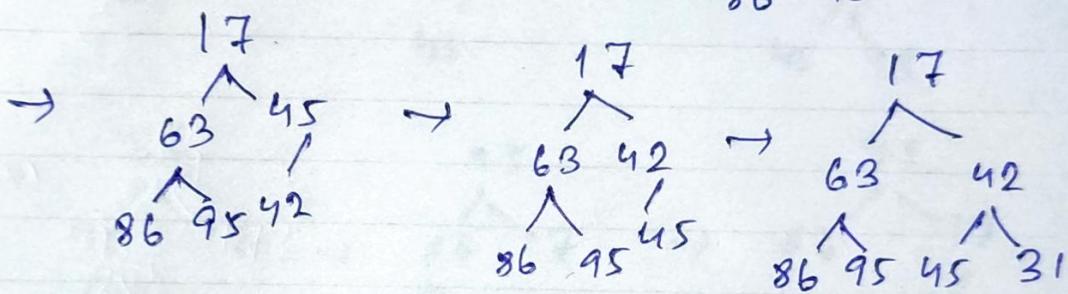
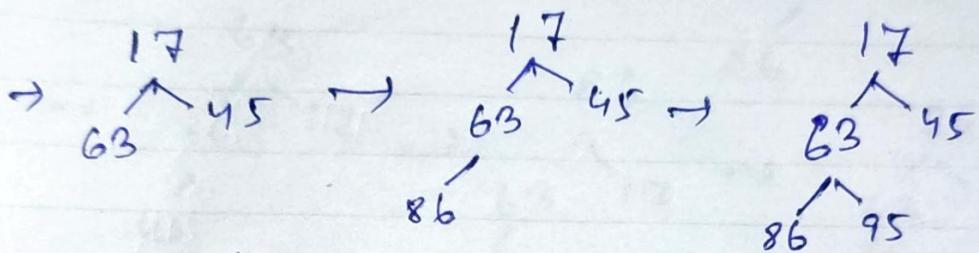
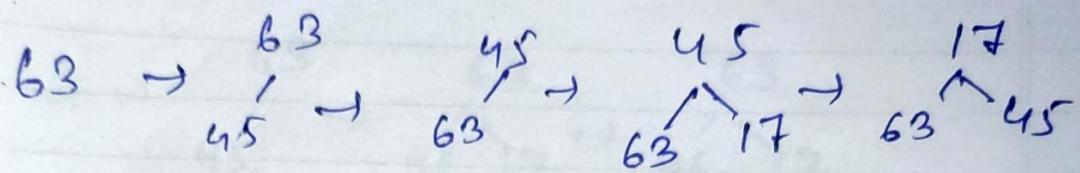
$\Rightarrow 63 \rightarrow \begin{matrix} 63 \\ | \\ 45 \end{matrix} \rightarrow \begin{matrix} 63 \\ | \\ 45 \end{matrix} \begin{matrix} 17 \\ | \\ 86 \end{matrix} \rightarrow \begin{matrix} 63 \\ | \\ 45 \end{matrix} \begin{matrix} 17 \\ | \\ 86 \end{matrix}$

$\rightarrow \begin{matrix} 63 \\ | \\ 86 \end{matrix} \begin{matrix} 17 \\ | \\ 45 \end{matrix} \rightarrow \begin{matrix} 86 \\ | \\ 63 \end{matrix} \begin{matrix} 17 \\ | \\ 45 \end{matrix} \rightarrow \begin{matrix} 86 \\ | \\ 63 \end{matrix} \begin{matrix} 17 \\ | \\ 45 \end{matrix} \begin{matrix} 95 \\ | \\ 31 \end{matrix}$

$\rightarrow \begin{matrix} 86 \\ | \\ 95 \end{matrix} \begin{matrix} 17 \\ | \\ 45 \end{matrix} \rightarrow \begin{matrix} 95 \\ | \\ 86 \end{matrix} \begin{matrix} 17 \\ | \\ 45 \end{matrix} \rightarrow \begin{matrix} 95 \\ | \\ 86 \end{matrix} \begin{matrix} 17 \\ | \\ 45 \end{matrix} \begin{matrix} 63 \\ | \\ 31 \end{matrix} \begin{matrix} 42 \\ | \\ 20 \end{matrix}$

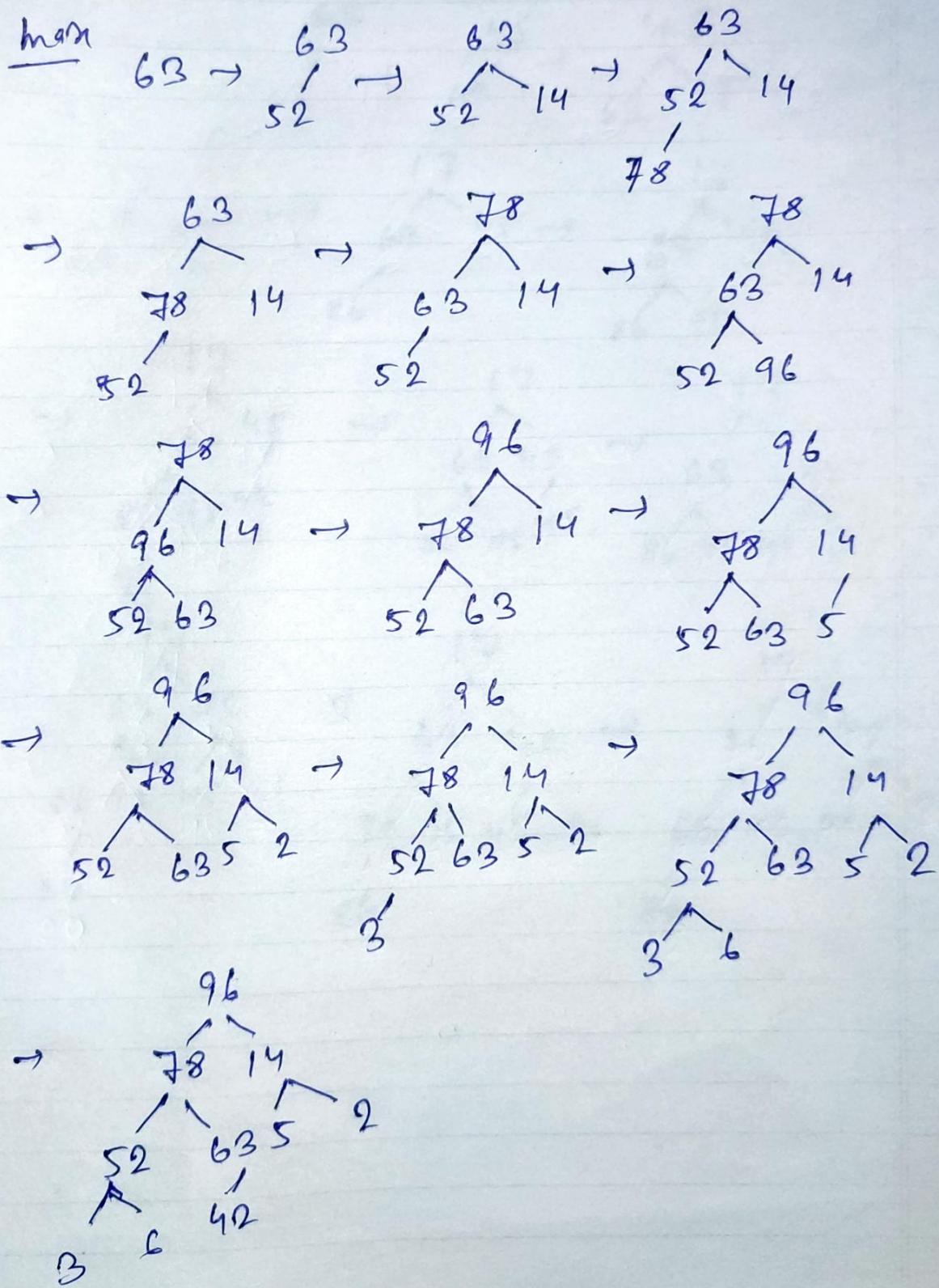
$\rightarrow \begin{matrix} 95 \\ | \\ 86 \end{matrix} \begin{matrix} 42 \\ | \\ 45 \end{matrix} \rightarrow \begin{matrix} 95 \\ | \\ 86 \end{matrix} \begin{matrix} 42 \\ | \\ 45 \end{matrix} \begin{matrix} 31 \\ | \\ 20 \end{matrix} \rightarrow \begin{matrix} 95 \\ | \\ 86 \end{matrix} \begin{matrix} 42 \\ | \\ 45 \end{matrix} \begin{matrix} 31 \\ | \\ 20 \end{matrix}$

⑧

min heap

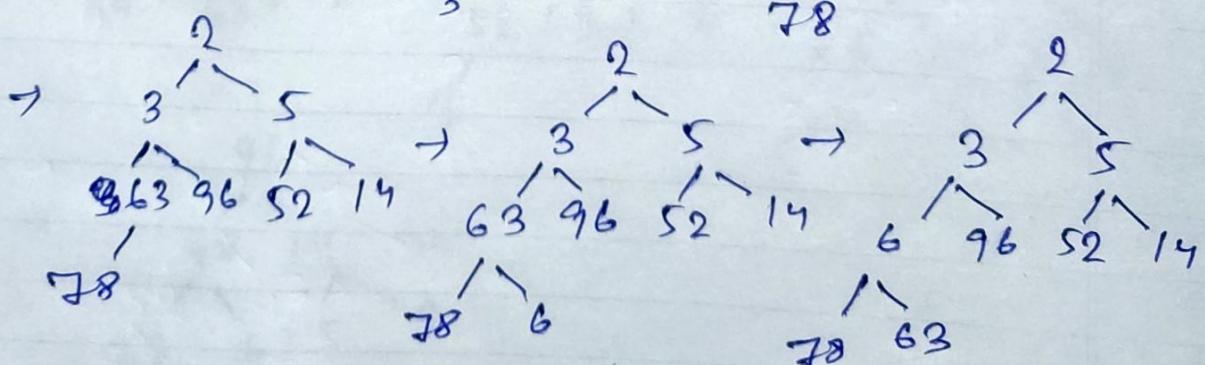
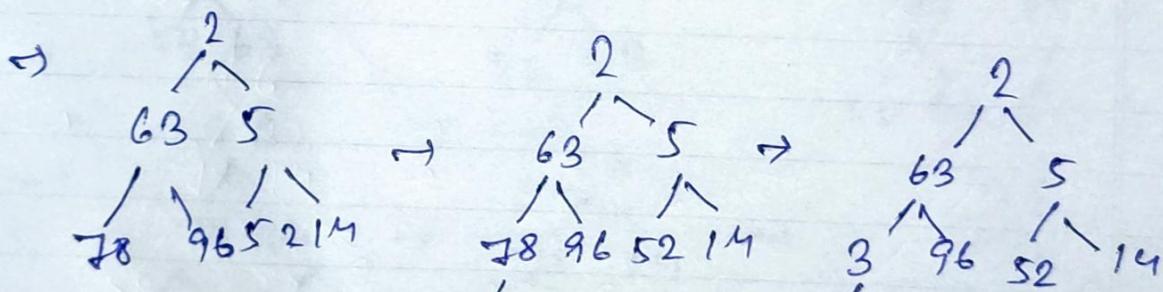
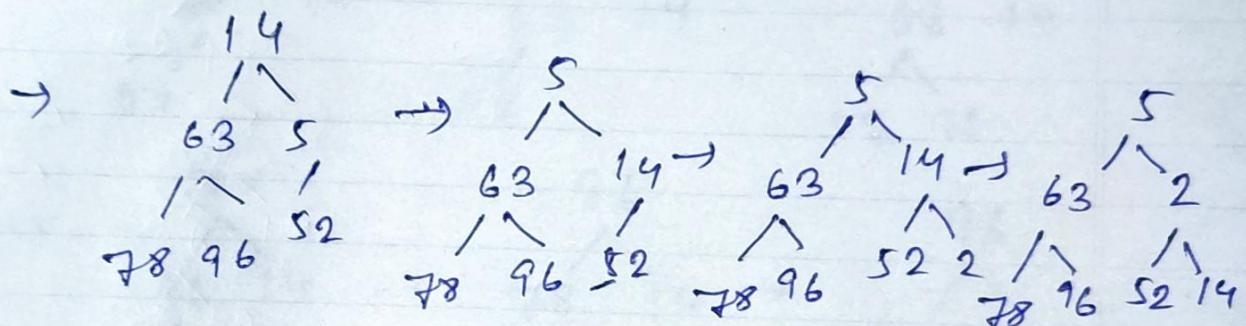
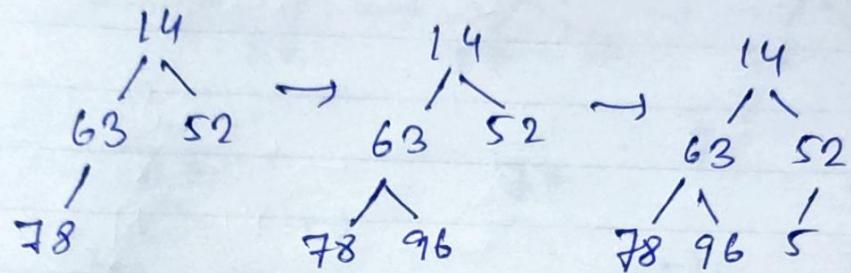
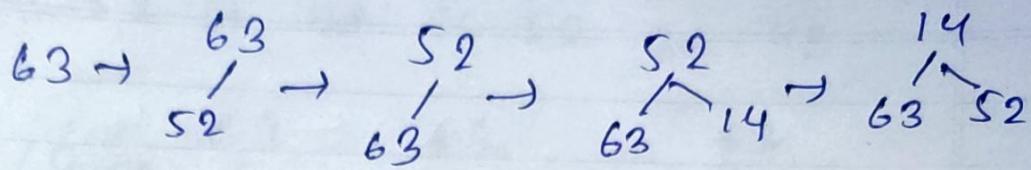
5) 63 52 14 78 96 52 36 42

③



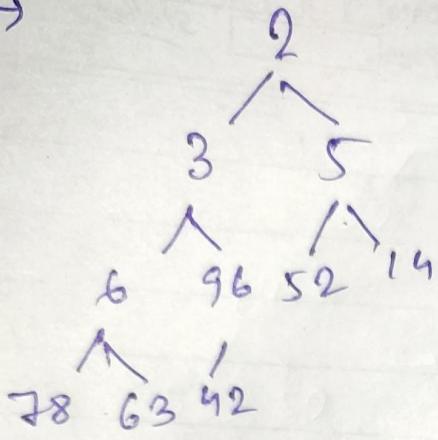
16

Hin

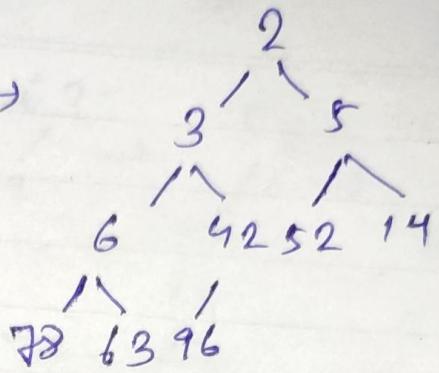


→

⑪



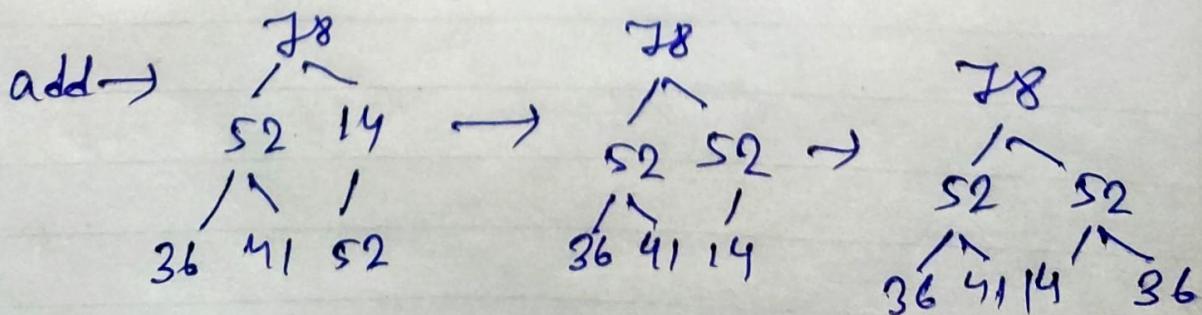
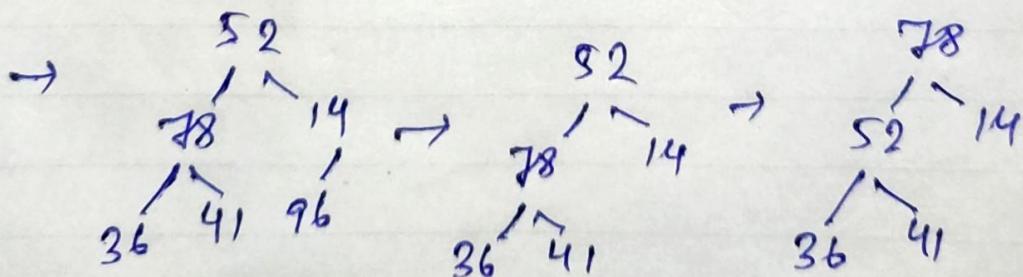
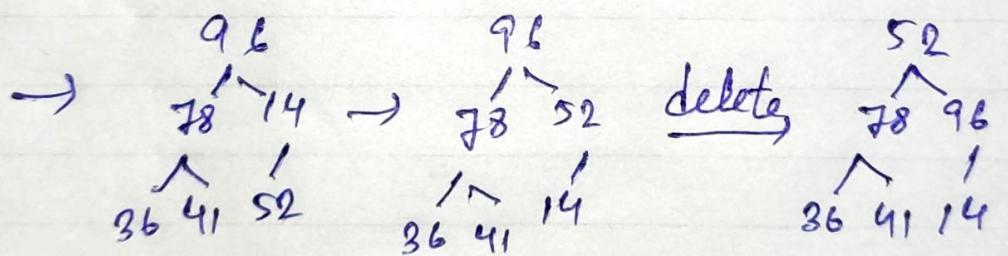
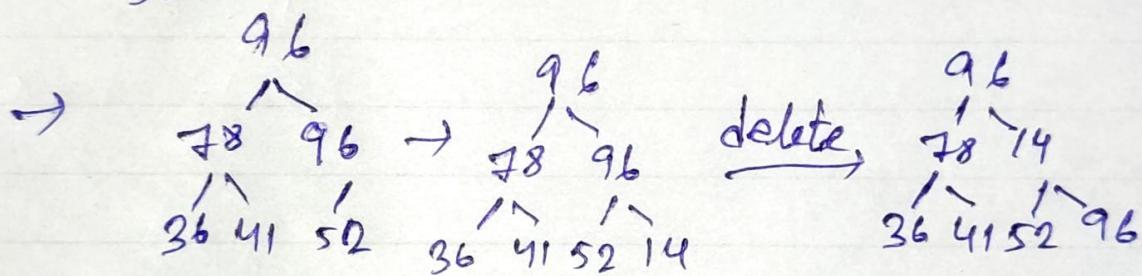
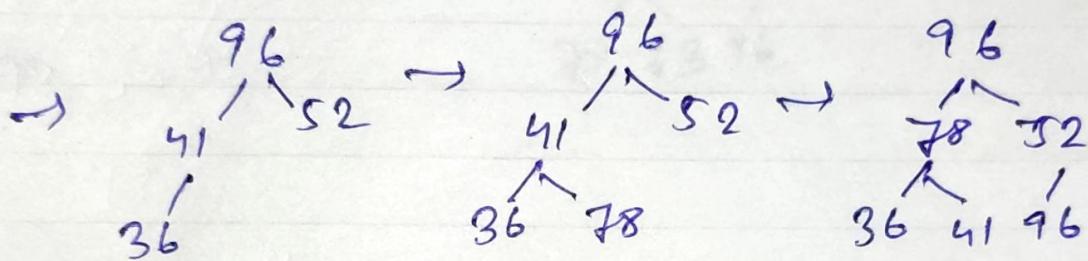
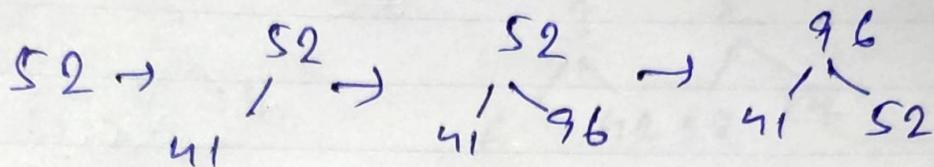
→



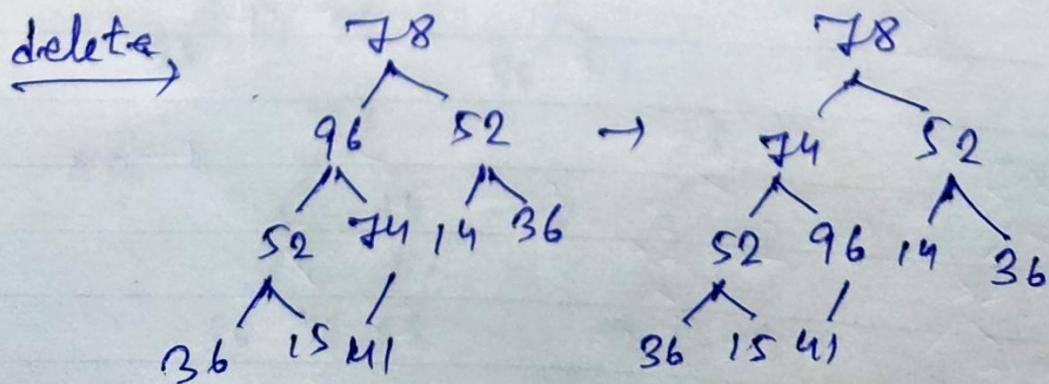
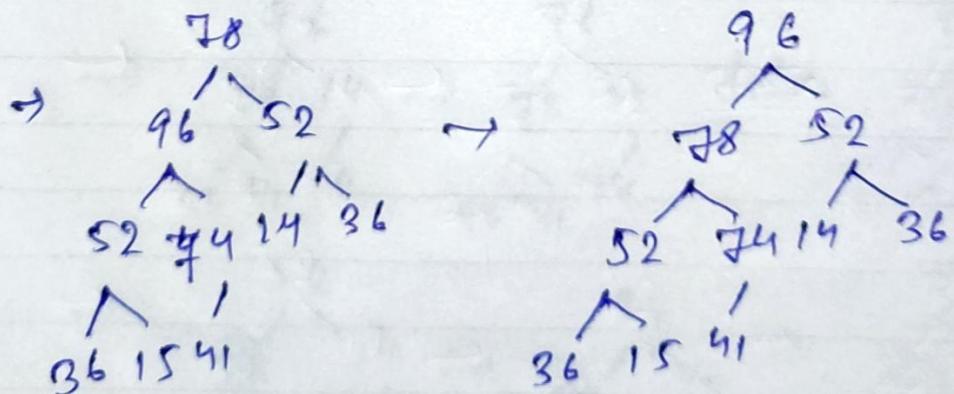
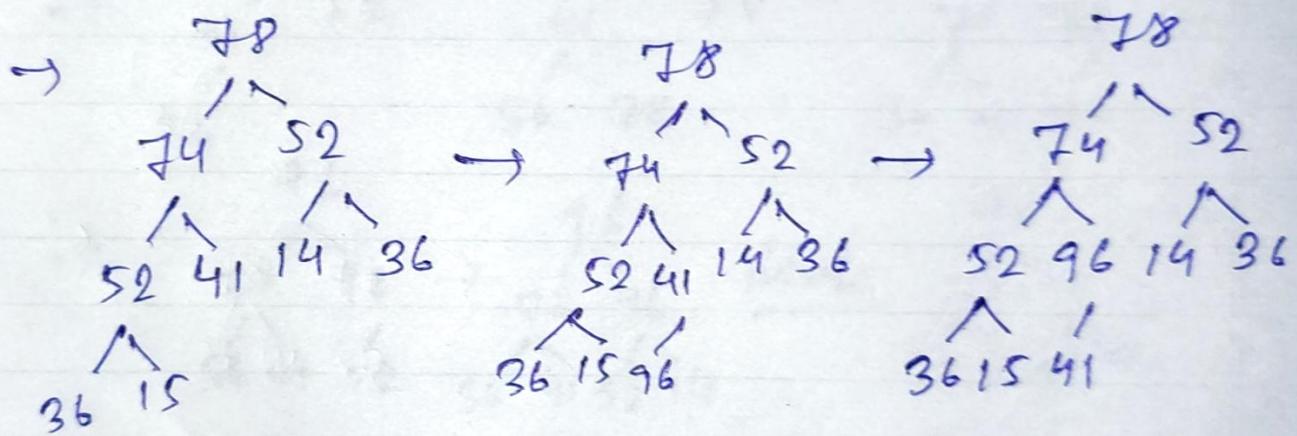
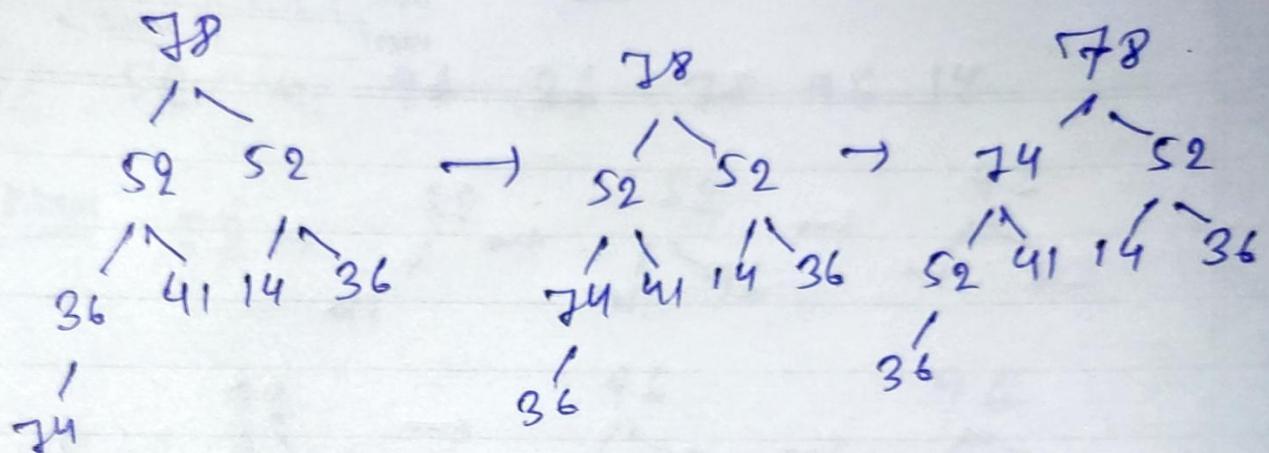
(12)

B>

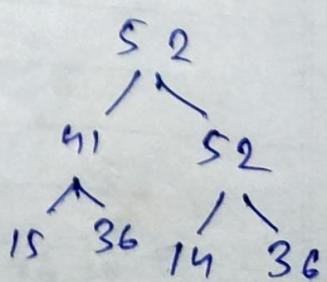
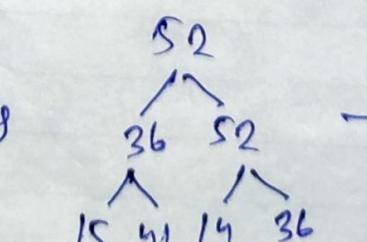
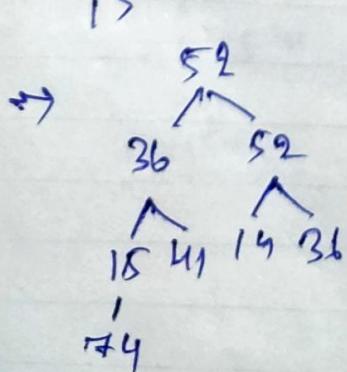
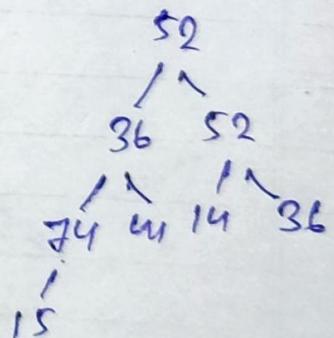
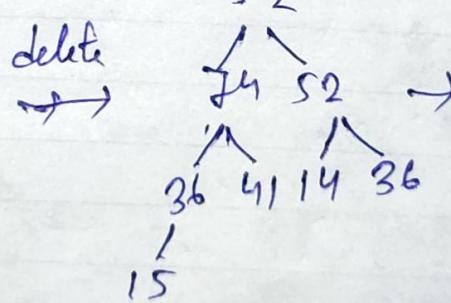
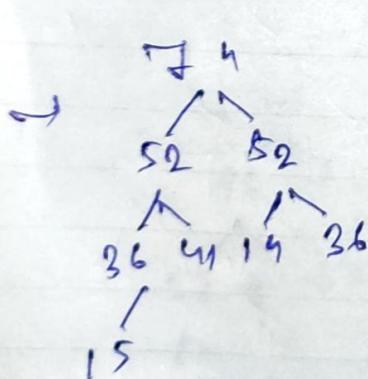
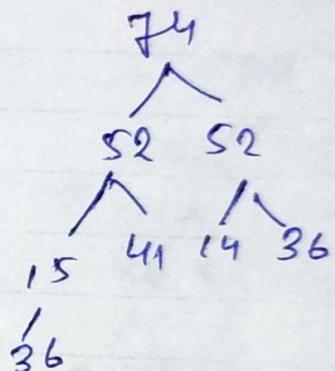
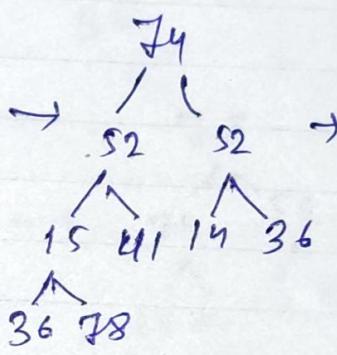
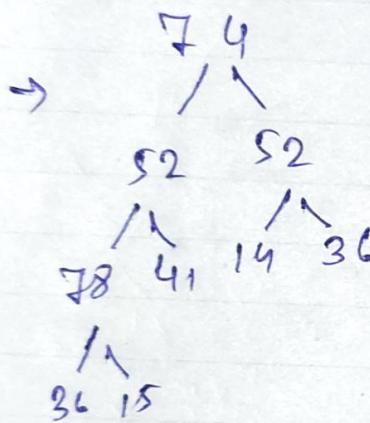
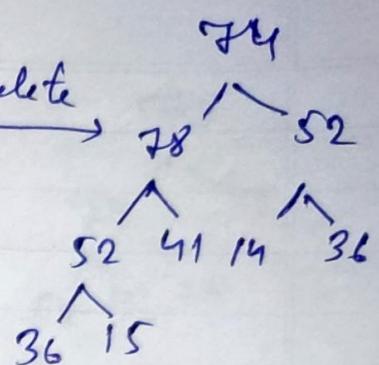
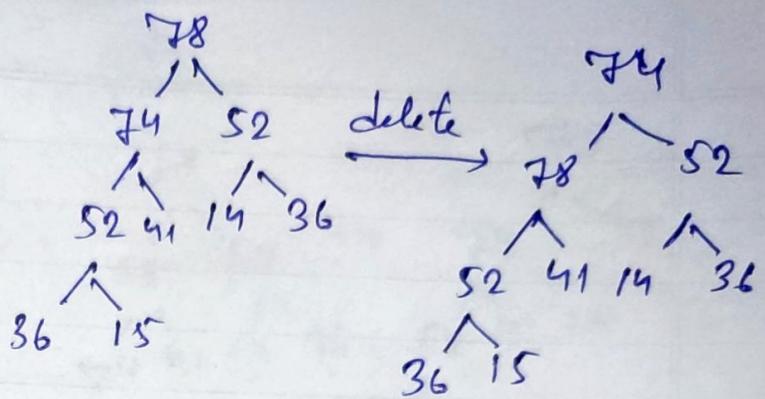
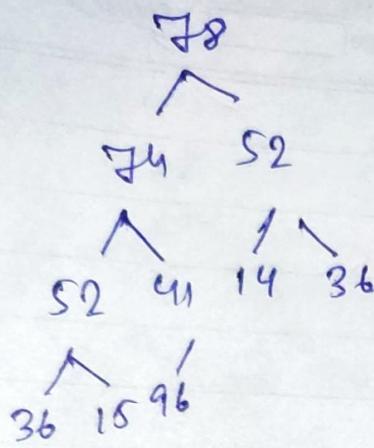
52 41 96 36 78 96 14

Min

(13)

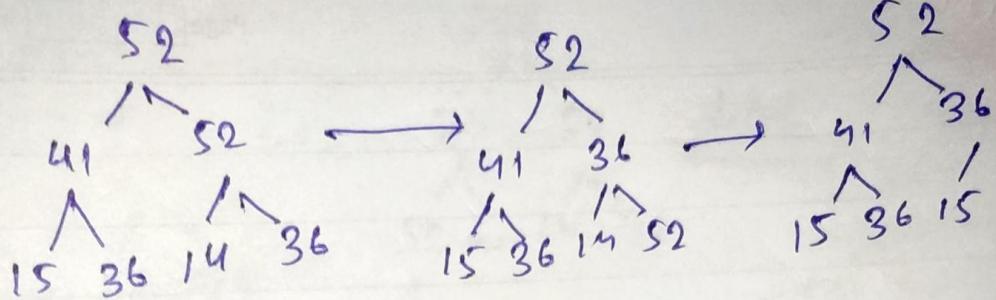


(15)



delete

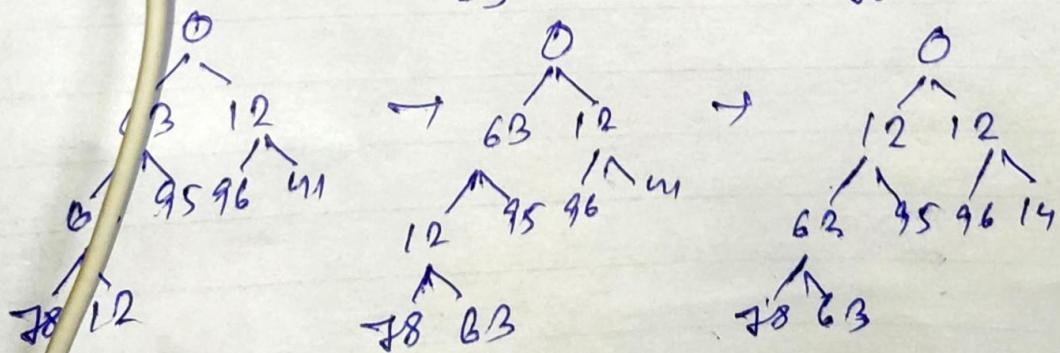
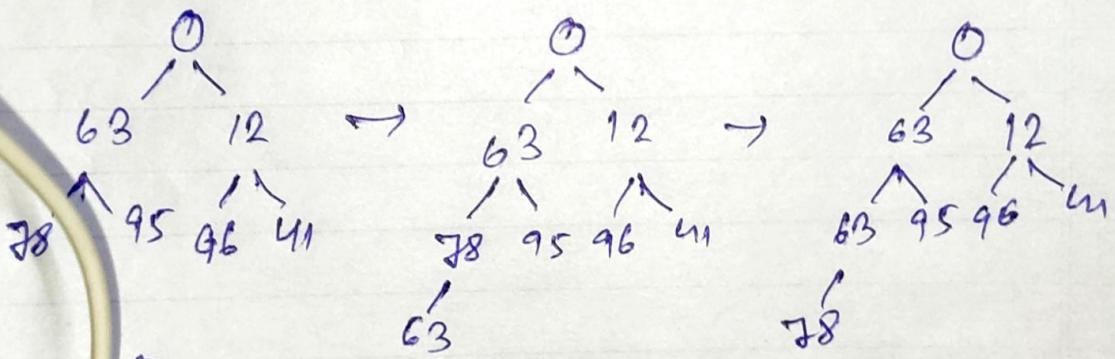
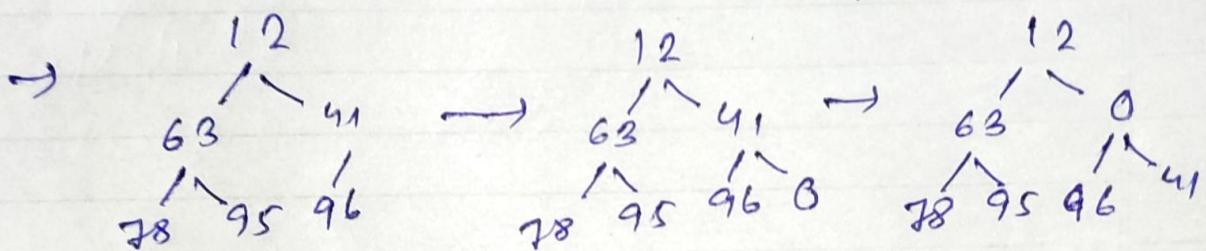
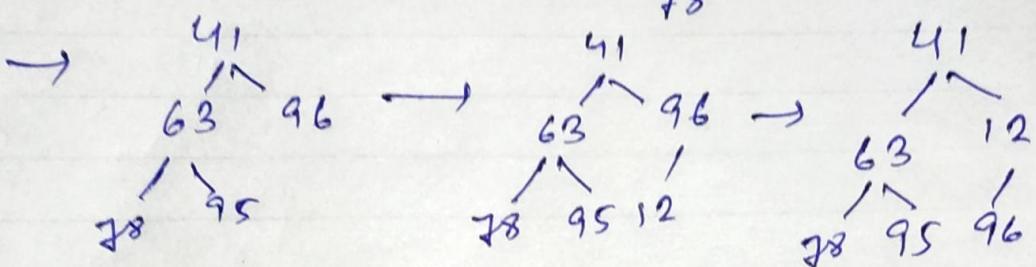
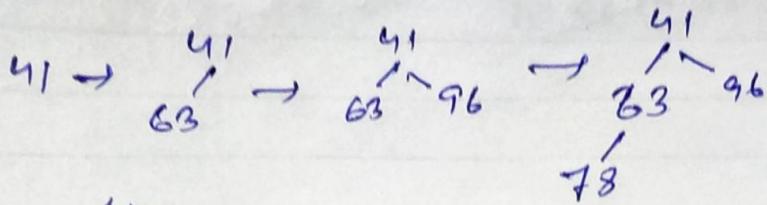
(15)



⑯

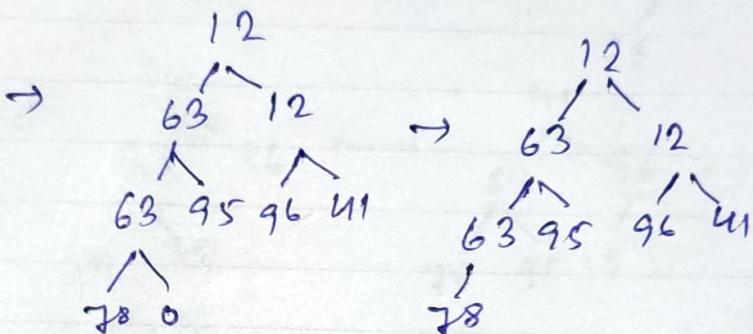
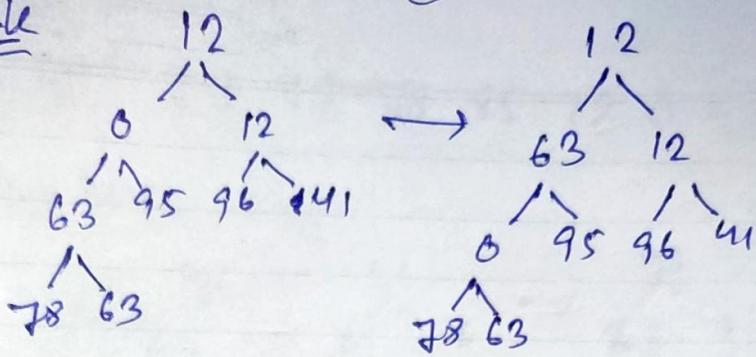
c) 41 63 96 78 95 12 0 63 12

→ min heap



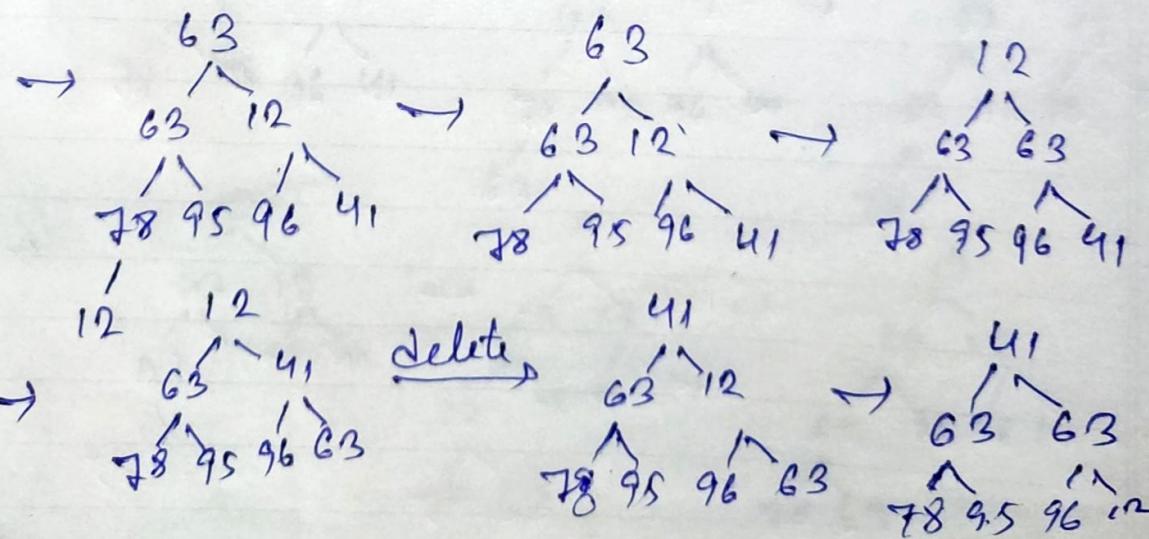
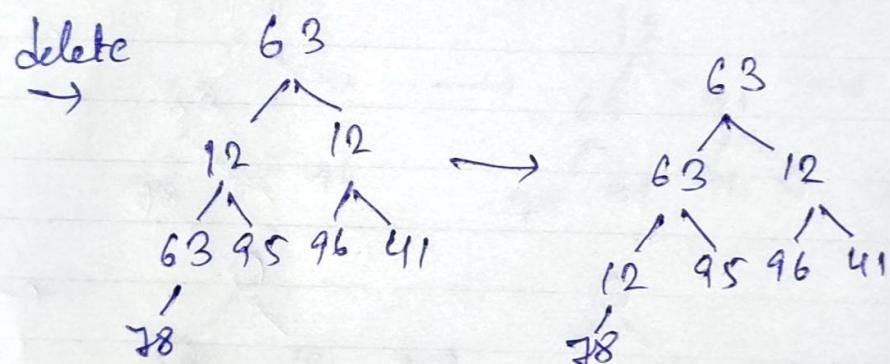
delete

(17)



delete

63



18

