1.) We want to select t so that a full node uses as much of a disk block as possible. In a full node there are $2t-1$ keys (4 bytes each). Hence we want to pick t as large as we can so that $12(2t-1)+4(2t) = 32t-12 \leq 4096$.

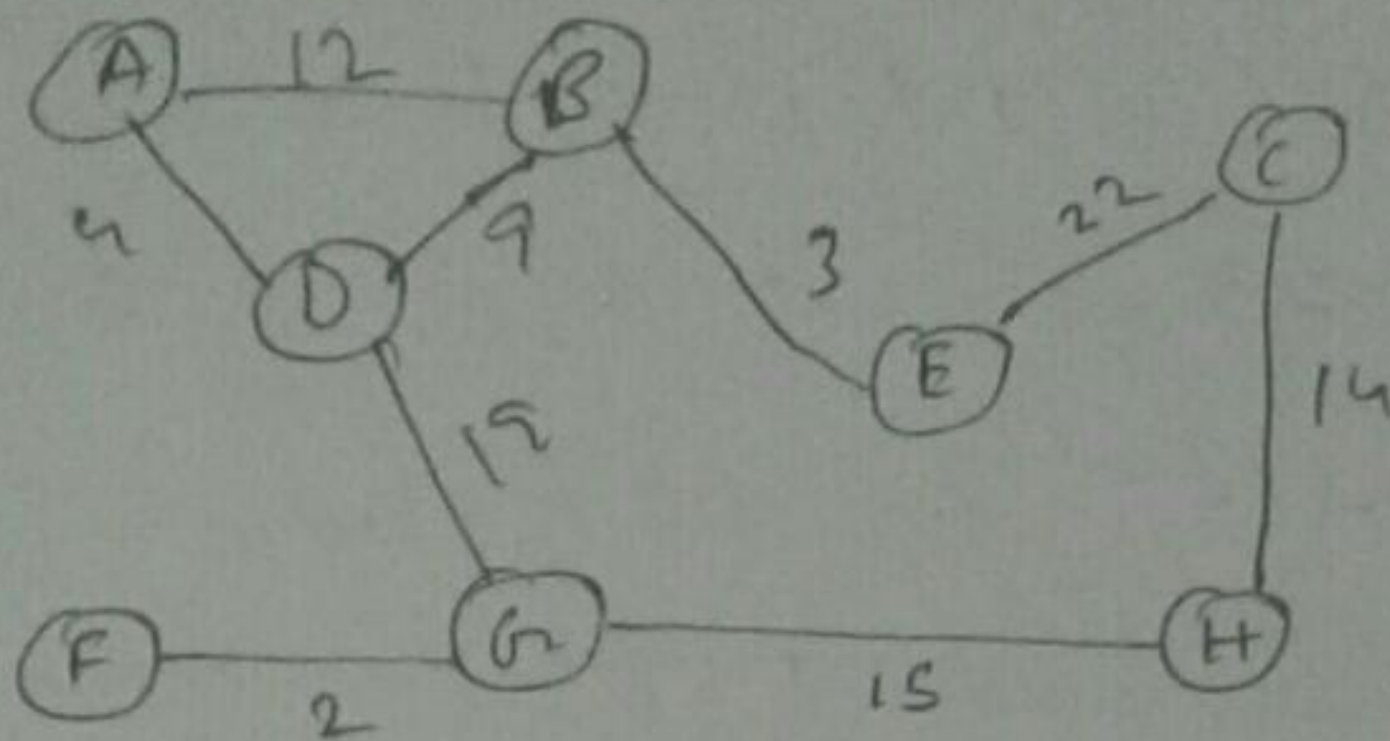Solving for t yields that we need $t \leq 128.375$. Hence we will pick $t=128$.

For $t=128$ and $n=1,00,000$ the height is at most $\log_{128} \frac{(n+1)}{2}$

$= \log_{128} \approx 2.7$.

Since the height is an Integer, the tree will have at most 2 and hence there will be at most 2 pages brought into main memory during a search.

3.)

| String | | | | | | | | | | | | | Reason |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| a | b | c | d | e | f | g | ʰf | h | ⁱi | f | ᵢj | k | |
| i | d | e | f | i | x | | | | | | | | Initial |
| | i | d | e | f | i | x | | | | | | | shift(f) = 2 |
| | | i | d | e | f | i | x | | | | | | shif(f) = 2 |
| | | | i | d | e | f | i | x | | | | | shif(i) = 1 |
| | | | | i | d | e | f | i | x | | | | shif(f) = 2 |

2.) Given,



| | | | vertex | weight | length |
|---|---|---|---|---|---|
| 1 | D | A | 4 | 4 |
| | | B | 9 | 9 |
| | | G | 19 | 19 |
| 2. | A | B | 12 | 9 |
| 3 | B | E | 3 | 12 |
| 4 | E | C | 22 | 34 |
| 5. | G | F | 2 | 21 |
| | | H | 15 | 34 |
| 6 | F | - | - | 21 |
| 7 | C | - | - | 34 |
| 8. | H | - | - | 34 |

| A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|
| 4 | 9 | 34 | 0 | 12 | 21 | 19 | 34 |