

Subjective Questions

Write detailed answers. Adequately explain your assumptions and thought process.

1. [10 points] There are 2 jars of capacities 89 L and 144 L respectively. First you are given a jar after using which is taken back and you are handed the next jar. Assume the presence of a sufficiently large bucket and unlimited water supply. How would you exactly measure 1L of water?

4. [10 points] Solve system of linear congruences:

$$a_n \equiv a_{n-1} + 2a_{n-2} \pmod{5}$$

$$a_n \equiv 2a_{n-1} - 2a_{n-2} \pmod{7}$$

(1)

where $a_0 \equiv 0 \pmod{35}$ and $a_1 \equiv 1 \pmod{35}$

$$a_n \equiv 0 \pmod{5}$$

3. [4 points] Forest of n nodes and k trees has exactly how many edges? Prove your answer.

2. [5 points] You are given a string consisting of 15 A's, 10 B's, 33 C's, 21 D's, and 52 E's. Find the Huffman encoding over alphabet $\{0, 1\}$.