Question 5) Charlotte's test

Let use bit notation ie True = 1, False = 0.

∴ There are exactly three trues among five consecutive questions.

∴ 3 1's and 2 0's. XORing all gives 1.

∴ 5 consecutive bits : [1] [2] [3] [4] [5] $XOR_1 = 1$ (Given)

∴ Next 5 consecutive bit : [2] [3] [4] [5] [6]

$$\therefore XOR_2 = XOR_1 \oplus [1] \oplus [6]$$
$$= 1 \text{ (Given)}$$

∴ As $XOR_1 = 1$, $1 \oplus [1] \oplus [6] = 1$

∴ $[1] \oplus [6] = 1 \oplus 1$

$= 0$

∴ After every four questions the answer repeats.

∴ As 1st is ~~true~~ false, 6^{th}, 11^{th}, ---- 96^{th} are ~~true~~ false.

∴ As 100^{th} is ~~true~~ false, 95^{th}, 90^{th}, ---- 5^{th} are ~~true~~ false.

∴ As 1st and 5^{th} are ~~true~~ false, 2^{nd}, 3^{rd} and 4^{th} must be true.

∴ The sequence of answer is : F T T T F F T T T F ---- T T F

∴ a) 6^{th} question answer is false

b) There are total 60 ~~true~~ ~~answers~~ questions with answer true.

c) By following sequence Charlotte can score 100.