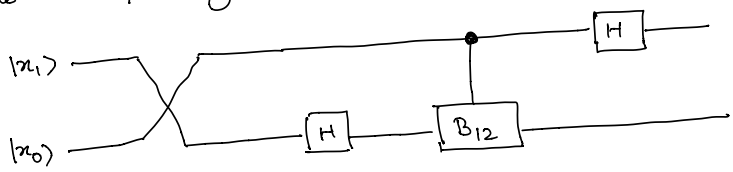
Due date : 20-11-2020

In the two qubit case, $n = 2$, we found the Quantum Fourier transform for $|x\rangle = |x_1 x_0\rangle$ as follows:

$$|\hat{x}\rangle = \frac{1}{\sqrt{4}} \left(|0\rangle + (-1)^{x_0}|1\rangle\right) \otimes B_{12}^{x_0} \left(|0\rangle + (-1)^{x_1}|1\rangle\right)$$

$$= (U_H \otimes I)\, U_{12}\, (I \otimes U_H)\, U_{SWAP}\, |x_1, x_0\rangle$$

The corresponding Quantum circuit for its implementation was:



Now, carrying out a similar analysis, for the three qubit case ($n = 3$), find the Quantum Fourier Transformation for $|x\rangle = |x_2 x_1 x_0\rangle$. Draw the appropriate quantum circuit for its implementation.

(Total marks : 05)