

Quantum Computing
Assignment 6
(Working with superdense coding, Teleportation)

Instructions: The assignment is self-explanatory. Try yourself, as these concepts will be used for later assignments.

Section I

Superdense Coding Protocol is a procedure that allows someone to send two classical bits to another party using just a single qubit of communication. Implement the superdense coding protocol in Qiskit. Refer <https://qiskit.org/textbook/ch-algorithms/superdense-coding.html>

Section 2

Teleportation Protocol is a procedure by which the state of qubit ($|\psi\rangle$) can be transmitted from one location to another using two bits of classical communication and a Bell pair. Implement the teleportation protocol in Qiskit. Refer <https://qiskit.org/textbook/ch-algorithms/teleportation.html>

Section 3

Phase Kickback

1. Explain the procedure of reverse CNOT using the concept of Phase Kickback. You can implement the reverse CNOT operation in Qiskit.
2. Implement the kickback process using T-gate.

You can refer <https://qiskit.org/textbook/ch-gates/phase-kickback.html> for details.