Quantum Architecture and Programming
CS F316
BITS PILANI, GOA CAMPUS

ASSIGNMENT 2 - Version 1.0

30 units

In this assignment, the goal is to understand the Deutsch-Jozsa algorithm from a quantum computing perspective. Your task is to program the algorithm using quantum computing principles, study the obtained results and write a report describing what you did and understood. The report should be a maximum of **four pages** and **11 pt font size**. Include figures as necessary.

For reference, please refer to the following section of the qiskit textbook.

https://qiskit.org/textbook/ch-algorithms/deutsch-jozsa.html

Following are some of the deliverances expected from the submission/report.

- Give a working example of a balanced and a constant function for size two and size four input registers.
- Code balanced and constant function of size two and size four input registers and draw the schematics and get the results.
- Code balanced and constant function for size ‘n’ input register and draw the schematics and get the results.
- Explain how the time required for the algorithm changes with ‘n’. Draw a graph for different sizes of the input register versus the time.
- Similarly, explain how the resources (in this case, the quantum gates of a particular type and their count) required for the algorithm changes with ‘n’. Draw a graph for different sizes of the input register versus the resources.
- Explain the power of the quantum approach to solve this algorithm versus the classical approach.

Please refer to quanta for the submission deadline.

We shall also send instructions on quanta about running the code on actual IBM machines. This is optional but highly recommended.