Course Details

Module A: Introductory Module

Speaker: Bhargab B. Bhattacharya

Lecture 1: (Aug 08, 9:30-10:30 & 10:45-11:45) -- 2 hours

Evolution of logic design techniques over the years (conventional approach, binary decision diagram, Multiplexer based synthesis)

Lecture 2: (Aug 08, 14:00-15:00& 15:15-16:15) -- 2 hours

Other non-conventional logic design methodologies (Reed-Muller canonical form, exclusive-OR sum of Products form, threshold logic)

Module B: Logic design using Memristor

Speaker: Dr. Kamalika Datta

Lecture 3: (Aug 09, 9:30-10:30) -- 1 hour

Introduction to Memristor, principle of operation, memristor simulation models, memristor fabrication

Lecture 4: (Aug 09, 10:45-11:45 & 14: 00-15: 00) -- 2 hours

Logic design techniques using memristors, implementing IMPLY function using memristors, synthesis of logic functions using IMPLY functions

Lecture 5: (Aug 10, 9:30-10:30) -- 1 hour

Memristor crossbar array, issues and sneak path avoidance, using memristors to build threshold logic gates, applications to neuromorphic computing

Module C: Quantum circuits and their design

Speaker: Prof. Robert Wille

Lecture 6: (Aug 10, 10:45-11:45 & 12: 00-13: 00) -- 2 hours

Basics: Quantum circuits, reversible circuits, and their applications

Lecture 7: (Aug 11, 9:30-10:30) -- 1 hour

Design of reversible circuits (Synthesis and Verification)

Lecture 8: (Aug 11, 10:45-11:45) -- 1 hour

Design of quantum circuits (Decomposition and Optimization)

Lecture 9: (Aug 12, 9:30-10:30 & 10: 45-11: 45) -- 2 hour

Physical architectures and constraints (1D/2D quantum circuits, Nearest neighbour constraints)

Lecture 10: (Aug 12, 12: 00-13: 00) -- 1 hour

Demonstration of decomposition, mapping and optimisation tools

Mid Term Test: Aug 10, 15:00-16:00

End Term Test: Aug 12, 15:00-17:00

Note: Lecture notes will be provided; hands on session will be carried out using Revkit, ABC tool and SPICE
