CS60089 Testing and Verification of Circuits
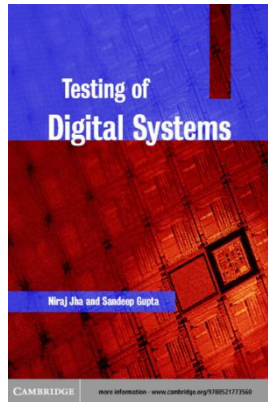
Dept. of Computer Science & Engg, IIT Kharagpur
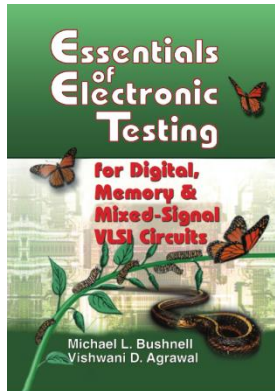
Pallab Dasgupta

Professor, Dept. of Computer Science & Engg.,
Professor-in-charge, AVLSI Design Lab,
Indian Institute of Technology Kharagpur
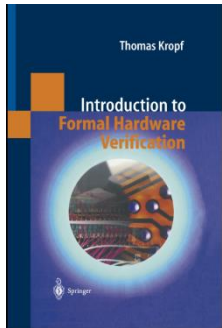
Main References - Testing

Testing of Digital Systems
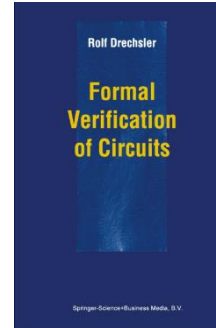N. K. Jha and S. Gupta
Cambridge University Press

Essentials of Electronic Testing
Michael L. Bushnell and V.D. Agrawal
Kluwer Academic Publishers

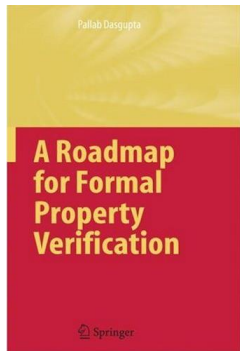**Course Web:** Moodle : Testing and Verification Autumn 2015
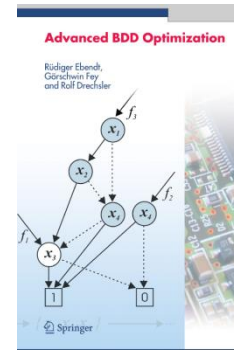
Main References - Verification

Introduction to *Formal Hardware Verification*
Thomas Kropf
Springer

Formal Verification of Circuits
Rolf Drechsler
Springer

A Roadmap for Formal Property Verification
Pallab Dasgupta
Springer

Advanced BDD Optimizations
Ebendt, Fey, Drechsler
Springer
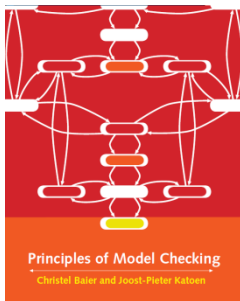
Principles of Model Checking
Christel Baier and J. P. Katoen
MIT Press

Course Web: Moodle : Testing and Verification Autumn 2015

Course Outline

- ✓ **Introduction**

- ✓ **Symbolic representations of combinational logic and finite state machines (BDD, SAT)**

- ✓ **Symbolic reachability of large state spaces**

- ✓ **Simulation Techniques**

- ✓ **Fault simulation**

- ✓ **Test generation for combinational circuits**

- ✓ **Formal Equivalence checking**

- ✓ **Temporal Logic and Assertions**

- ✓ **Automata over infinite words**

- ✓ **Model Checking**

- ✓ **Sequential ATPG**

- ✓ **Advanced topics:**

    - ▪ **Verification/Testing of Analog circuits**

    - ▪ **Hybrid System Analysis**

Lecture Series by Prof. Rolf Drechsler

"Advanced Formal Techniques along the Design Flow"

- ➢ **Motivation**
- ➢ **Proof techniques**
  - o **Boolean(DDs, satisfiability) , word-level (extensions of DD, SMT solvers)**
- ➢ **Verification**
  - o **Simulation vs. formal, constrained random simulation, measuring coverage**
- ➢ **Debugging**
  - o **Finding faults, error assumptions, corrections**
- ➢ **Test**
  - o **Black box vs. white box, encoding, hybrid approaches**
- ➢ **Conclusions**

Tentative Schedule:
- • **Aug 17 (Monday): 5:30 PM to 7:00 PM**
- • **Aug 18 (Tuesday): 4:30 PM to 6:30 PM**
- • **Aug 19 (Wednesday): 4:30 PM to 6:30 PM.**