EECS 579 Homework No.5

This assignment covers material from the lectures and the text Chapters 14 and 15.

Problem 1 (30 points) *Scan design of a modulo-5 counter*

(**a**) Text, page 486, Problem 14.5.

(**b**) Text, page 487, Problem 14.6.

Problem 2 (20 points) *Partial scan and S-graphs*

(**a**) Text, page 487, Problem 14.8.

(**b**) Text, page 487, Problem 14.11.

Problem 3 (10 points) *ATE*

(**a**) Construct a timing diagram with three waveforms to represent the 5-bit binary sequence 11001 using the following three data formats as defined for the HP 82000 tester: DNRZ, RZ and R1.

(**b**) Determine at least one advantage of each of these three data formats for design or testing purposes.

Problem 4 (30 points) *Pseudorandom test pattern generator*

(**a**) Find a primitive characteristic polynomial $P(x)$ suitable for designing an LSFR that can cycle through $2^8 - 1 = 255$ distinct states, so that it can serve as a test generator for an 8-input CUT. Specify (*i*) the polynomial $P(x)$; (*ii*) a logic circuit for the LFSR using D flip-flops and XOR gates only; (*iii)* the first four states generated by the LFSR when it is initialized to 00000001, where 1 is the least significant bit.

(**b**) Using as few extra NAND gates as you can, modify your LFSR so that it cycles through all 256 possible 8-bit states. Give the logic circuit for the modified LFSR and explain briefly how your modification works.

Problem 5 (10 points) *Compression testing*

Text, page 545, Problem 15.12.

End of Homework No. 4 (5 problems, 100 points)