

COE 561, Term 051

Digital System Design and Synthesis

HW# 3

Due date: Tuesday, Oct. 25

- Q.1.** Consider the function f whose ON-set is $F^{\text{ON}} = a'b'c' + a'c'd + ab'd + cd'$ and whose DC-set is $F^{\text{DC}} = a'cd$.
- (i) Represent the ON-set and DC-set in the positional cube notation.
 - (ii) Compute the off-set using each of the following techniques:
 1. The SHARP operator.
 2. The DISJOINT SHARP operator.
 3. The recursive complementation procedure outlined in section 7.3.4
 - (iii) Determine whether f contains cube $b'd$ by checking the tautology of the cofactor. Use the procedure outlined in section 7.3.4 for tautology check. Show all steps.
 - (iv) Compute all prime implicants of f using the method outlined in section 7.3.4.
 - (v) Compute all essential prime implicants of f using the method outlined in section 7.4.4.
 - (vi) Find a **minimum** cover of f .
 - (vii) Find a **minimum** cover by using the tool ESPRESSO-EXACT.
 - (viii) Find a **minimal** cover by using the tool ESPRESSO.
- Q.2.** Consider the function $f(a,b,c,d) = \sum m(0,1, 2, 3, 5, 6, 7, 9, 10, 11, 14)$.
- (i) Apply the following procedures in the given order EXPAND, IRREDUNDANT, REDUCE, EXPAND to obtain a minimized cover. Apply the heuristics used by ESPRESSO. Show each step in detail.
 - (ii) Verify your results after each step performed by running the ESPRESSO tool.