

COE 561, Term 111
Digital System Design and Synthesis

HW# 2

Due date: Saturday, Nov. 12

Q.1. Consider the function $F(A,B,C,D)$ with the following ON-set and DC-set:

$$F^{ON} = \sum m(0, 2, 3, 4, 5, 7, 8, 10, 12, 13, 15)$$

$$F^{DC} = \sum m(1, 11)$$

Apply the EXPAND procedure on the given cover using Espresso heuristics and show the obtained expanded cover. Compare your solution with the result obtained by ESPRESSO tool.

Q.2. Consider the function $F(A, B, C, D)$ with **ON-SET**= $\sum m(0, 4, 5, 7, 8, 12, 13, 15)$ and **DC-SET**= $\sum m(1, 3, 9, 14)$.

(i) A cover of the function is given by $F = C' + BD$. **Reduce** the cube C' using Theorem 7.4.1.

(ii) Use Corollary 7.4.1 to check if the implicant **BD** is an **essential** prime implicant.

Q.3. Consider the following cover of a function $F(A,B,C,D)$

$$F = \overline{A}\overline{B} + \overline{A}D + \overline{B}\overline{D} + BCD + ABC + A\overline{C}\overline{D}$$

(i) Determine the relatively essential set of cubes, E^r .

(ii) Determine the totally redundant, R^t , and partially redundant, R^p , sets of cubes.

(iii) Find a subset of R^p that, together with E^r , covers the function by solving a covering problem.

(iv) Compare your solution with the result obtained by ESPRESSO tool.