

Name:

Id#

COE 405, Term 181

Design & Modeling of Digital Systems

Quiz# 1

Date: Thursday, Sep. 20, 2018

- Q.1.** Area and testability are two important design criteria that are targeted during design. Explain the importance of minimizing area and having a design testable.
- Q.2.** Performance and power are two important design criteria that are targeted during design. Explain how performance and power of a design are optimized.
- Q.3.** Give two examples of semicustom design approaches.

Q.4. Consider the function $F = ABCDE$ and the set of implementations given below. Assume that the area and delay of a gate are directly related to the number of its inputs. Using only 2-input and 3-input AND gates:

(i) Design a circuit to implement the function F with the minimum area. Report the area and delay of your suggested circuit.

(ii) Design a circuit to implement the function F with the minimum delay. Report the area and delay of your suggested circuit.

Q.5. Consider the function: $F(A, B, C, D) = (A \oplus B)(C \oplus D)$

(i) Compute the expansion of F using the **Orthonormal Basis** $\{\phi_1 = \overline{A}\overline{B}, \phi_2 = \overline{A}B, \phi_3 = A\overline{B}, \phi_4 = AB\}$.

(ii) Compute the function \overline{F} utilizing the orthonormal based expansion of the function.

(iii) Implement the function F using minimal number of 2x1 MUXs and inverters.

(iv) Suppose that the function F is part of a circuit whose output is Y as shown below. Simplify the equation of F to minimum area.

