

**Q2** Consider a technology-dependent library that contains the following cells: (NAND2 with cost 2, NAND3 with cost 3, NAND4 with cost 4, AOI21 with cost 5, AOI22 with cost 6 and INV with cost 1. [5+5+3+4]

- a. For the Boolean function,  $F = [AB + (A+C) D] E$ , draw the subject graph using the base functions (2 input NAND and inverter). Find a minimum cost cover of the subject graph so as to minimize the area.
  - b. Using Chortle algorithm, find the minimum mapping function to cover the Boolean network of part (a). Assume K is equal to 3. (Assume fan-in and fan-out of each node in DAG is 2 and 1 respectively.) Show all the steps of the algorithm.
  - c. Using the Chortle-crf algorithm, find the minimum number of 3-LUTs needed to cover the Boolean function of part (a).
  - d. For the same function in part (a), assume logical AND and OR operators are replaced by multiplication and addition operators. The delay of multiplier unit is 3 clock cycles and that of adder unit is 1 clock cycle. Using ASAP algorithm, find the minimum bound on the latency. Using this latency, schedule the tasks using ALAP algorithm. Find mobility of each node?
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