Homework 1

Problem 1

A) {XNOR, NOR} {AND, OR, NOT}

AND = NOR {NOR(A,A), NOR(B,B)}

OR = NOR{NOR(A,B)}

NOT = NOR{A,A}.

{XNOR, NOR} is a complete set as AND, OR, and NOT gate can be implemented from this set, but it's not a minimal complete set as even if we remove XNOR, it doesn't effect the completeness.

B) {XNOR, OR}

AND = XNOR {OR(A,B), XNOR(A,B)}

OR = OR(A,B)

NOT = XNOR(A,0)

{XNOR, OR} -> is a complete set and also a minimal complete set as, to construct AND gate. both of the gates are required for sure.

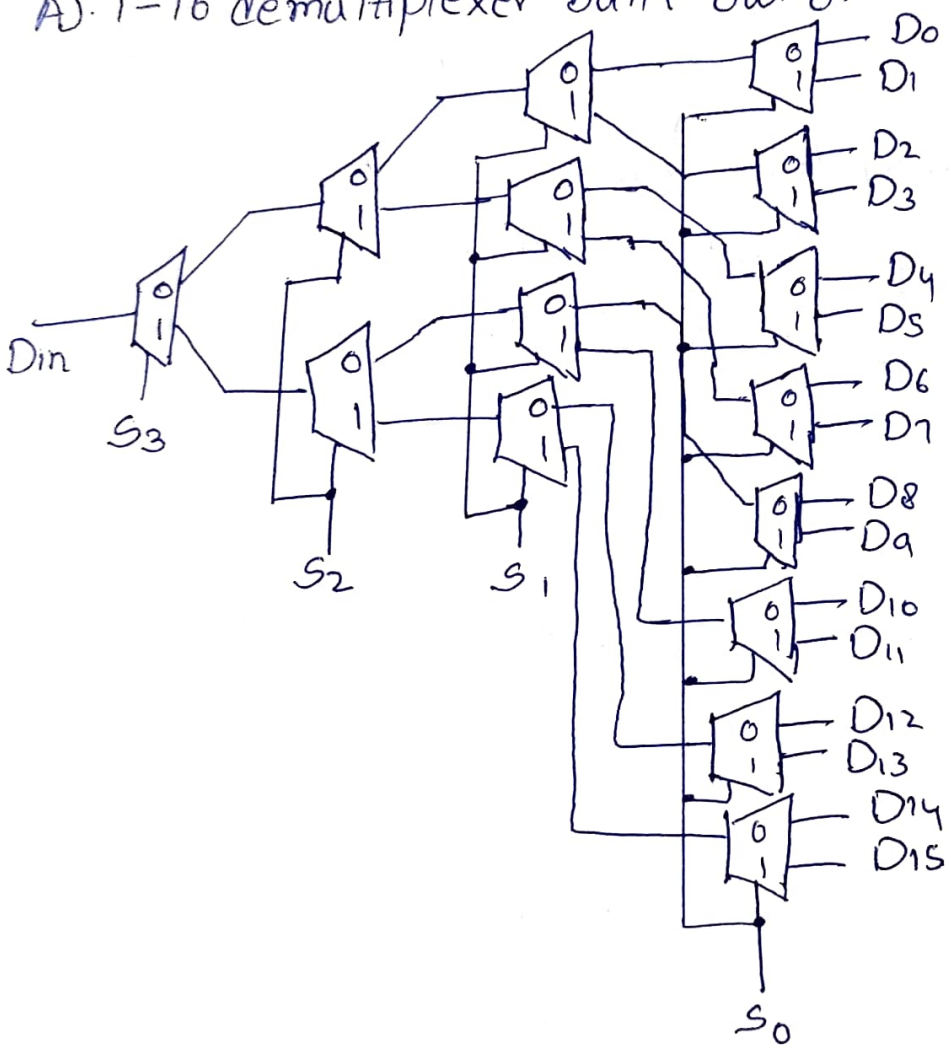
c) {XNOR, NOT}.

↓

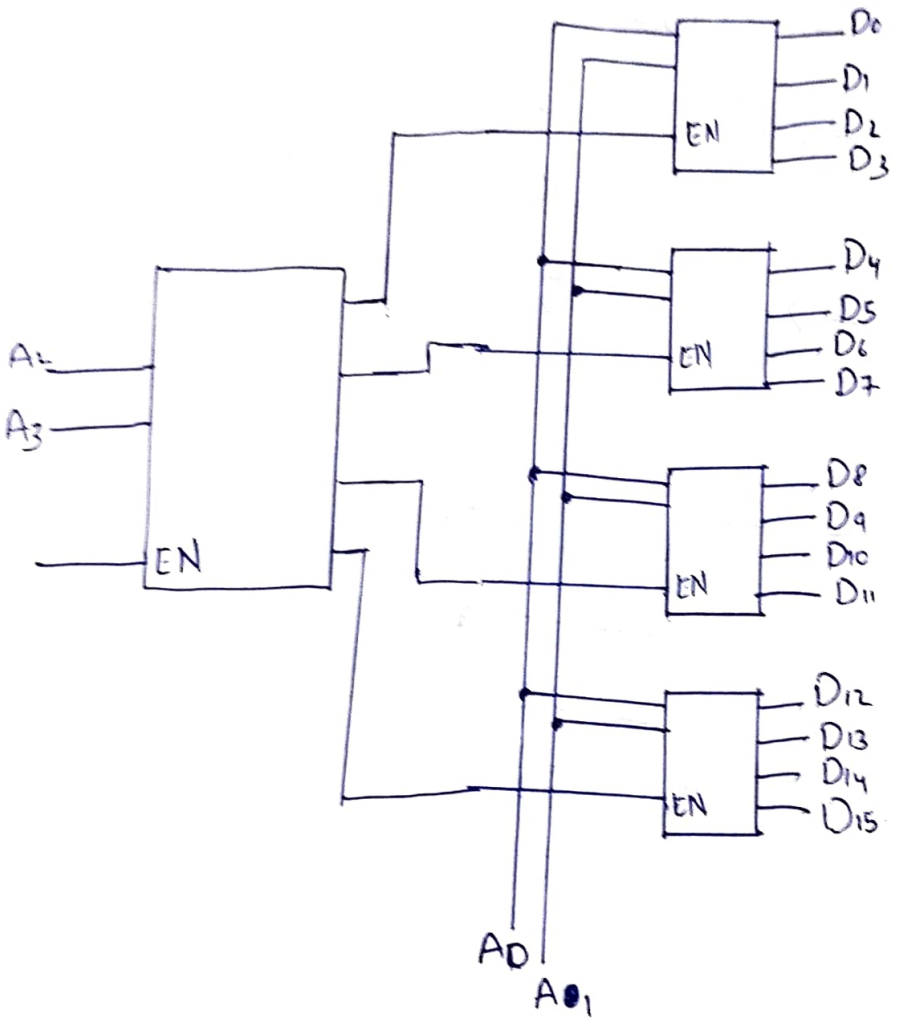
It is not a complete set as we cannot implement AND, OR gates using just XNOR, NOT gate.

Problem 3.

A). 1-16 demultiplexer built out of 1-2 demultiplexers



B) 4-16 decoder with enable built out of 2-4 decoders with enable.



Problem 6

12 bit Address

A_{11} A_{10} A_9 A_8 A_7 A_6 A_5 A_4 A_3 A_2 A_1 A_0

for $A_{11}A_{10}$ = 01 → A_9A_8 = 00 → 400 - 47F → e_0

→ 01 → 480 - 4FF → e_1

→ 10 → 500 - 57F → e_2

→ 11 → 580 - 5FF → e_3

Case B