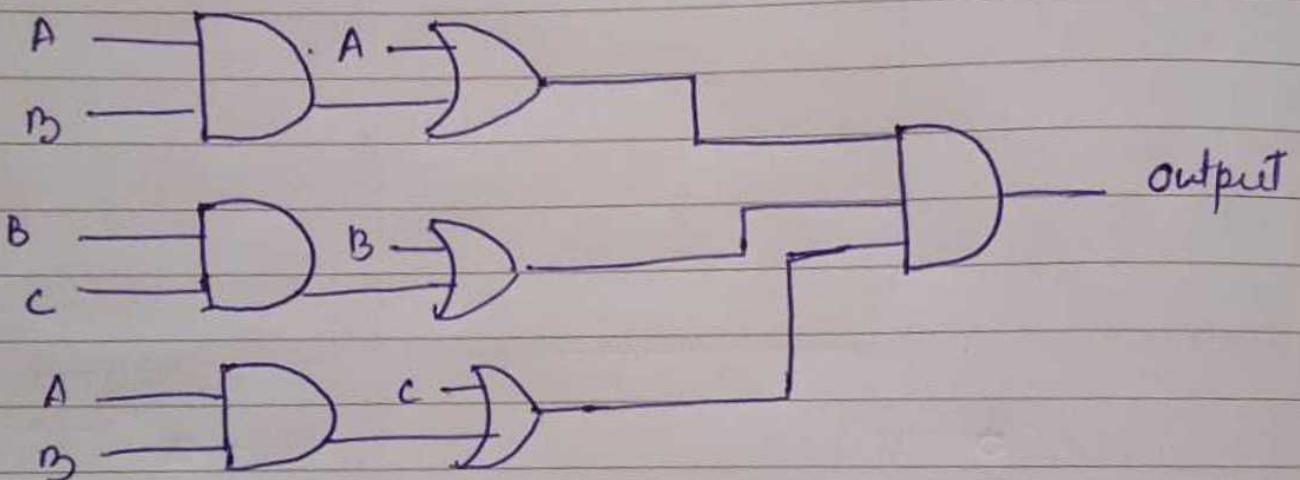
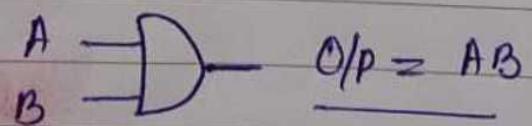


Q. Write the Boolean expression for the logic diagram given below and simplify it as much as possible and draw the logic diagram that implements the simplified expression.



$$\begin{aligned}
 \text{Soln:- } O/P &= (A+AB)(B+BC) (C+AC) \\
 &= A(1+B) B(1+C) (C+AB) \\
 &= AB(C+AB) = ABC + AB = AB(1+C) = AB
 \end{aligned}$$



21 29 30 31
28

Converting AOI (AND/OR/INVERT) Logic to NAND/NOR Logic:

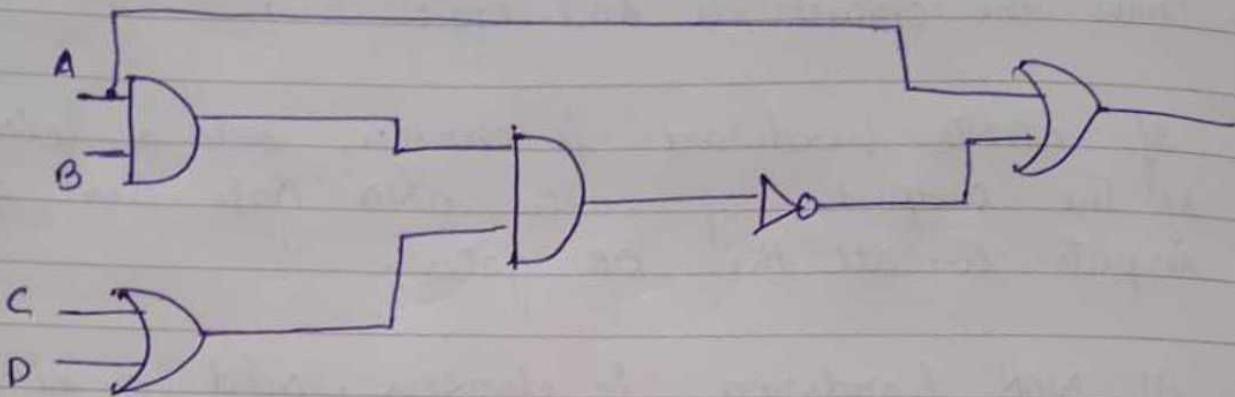
Steps

1. Draw the circuit in AOI logic.
2. If NAND hardware is chosen, add a circle at the output of each AND gate and at the inputs to all the OR gates.
3. If NOR hardware is chosen, add a circle at the output of each OR gate and at the inputs to all the AND gates.
4. Add or subtract an inverter on each line that received a circle in steps 2 & 3 so that the polarity of the signals on these lines remains unchanged from that of the original diagram.
5. Replace bubbled OR by NAND and bubbled AND by NOR.
6. Eliminate double inversions.

M	T	W	T	F	S
31					
3	4	5	6	7	8
10	11	12	13	14	15
17	18	19	20	21	22
24	25	26	27	28	29

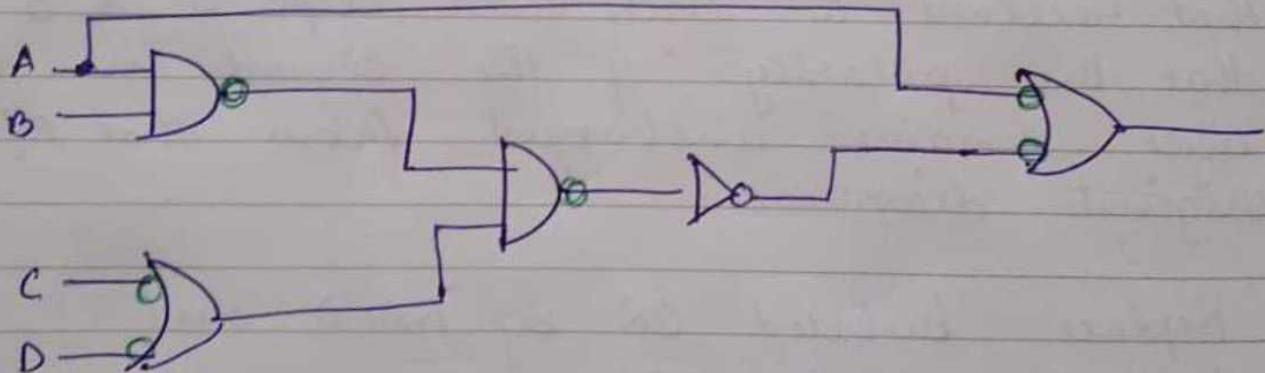
Ex:- Convert the following AOI logic circuit to

- Ⓐ NAND logic Ⓑ NOR logic.

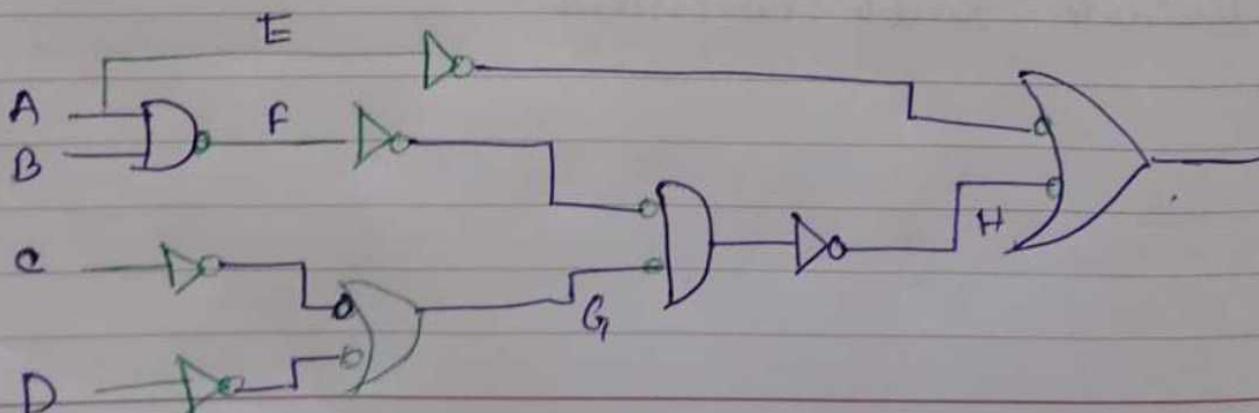


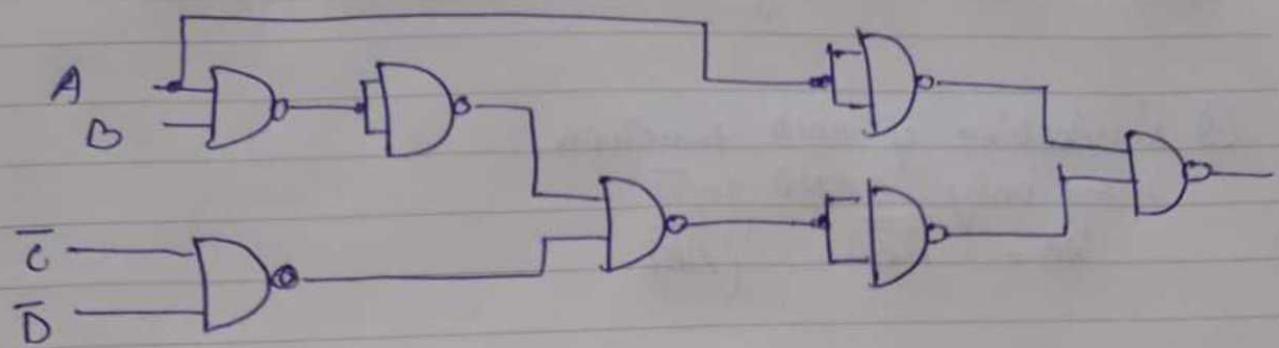
Soln :- Ⓐ NAND logic :-

Step 1 ~~break~~ circle at the AND o/p & OR i/p.



Step 2

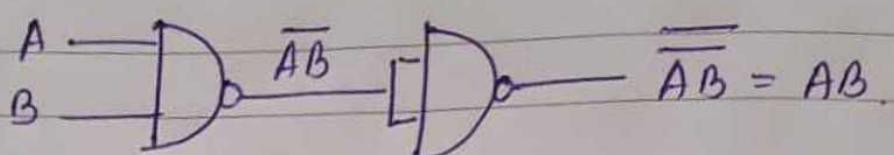


Step 3Z =

NOR logic

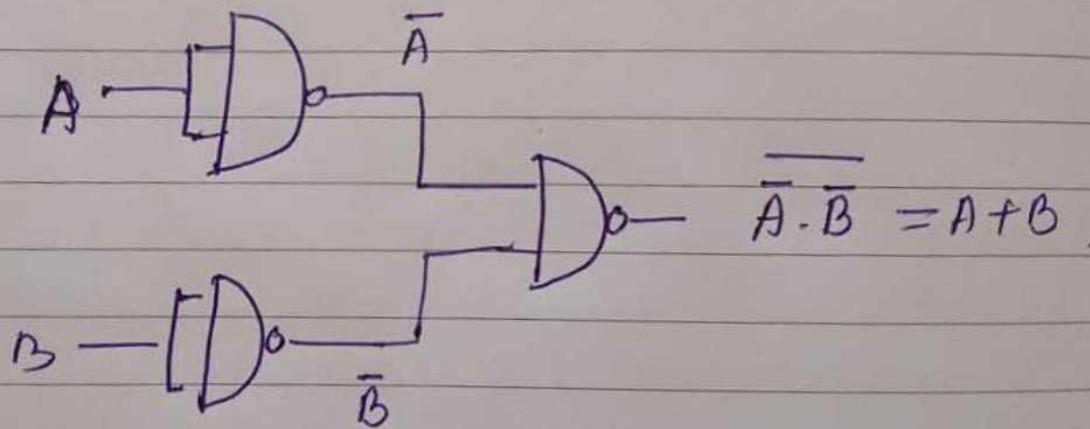
NAND and NOR gates as universal gates:-

- ① Realization of AND function using only NAND gates
- $$AB = \overline{\overline{AB}} = (\overline{AB})$$



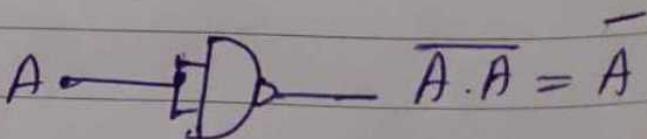
- ② Realization of OR function using only NAND gates.

$$A+B = \overline{\overline{A}+\overline{B}} = \overline{\overline{A}\cdot\overline{B}}$$



- ③ Realization of NOT function using only NAND gates.

$$\overline{A} = \overline{A \cdot A}$$



Your work:-

Realization of AND, OR and NOT function
using only NOR gate.