1

Q1   Implement using 2 to 4 decoder

$$F(A, B, C) = BC + ABC' + AC$$

$F = BC + ABC' + AC$

A	BC
0	1 1
1	1 1

A	B	C
1	0	1
1	1	1

$F = \bar{A}BC + ABC + AB\bar{C} + A\bar{B}C$

$= \bar{A}BC + A\bar{B}C + AB(C + \bar{C})$

$= \bar{A}BC + A\bar{B}C + AB$
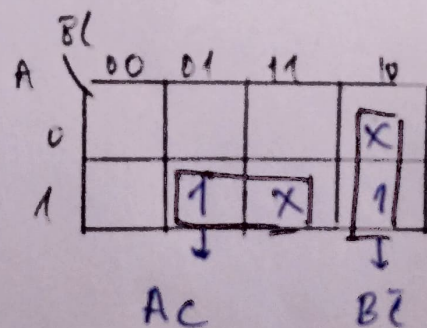
(Since $x + \bar{x} = 1$)

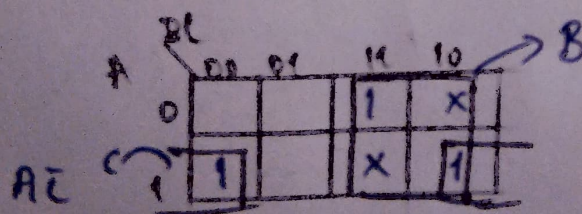S20210010027
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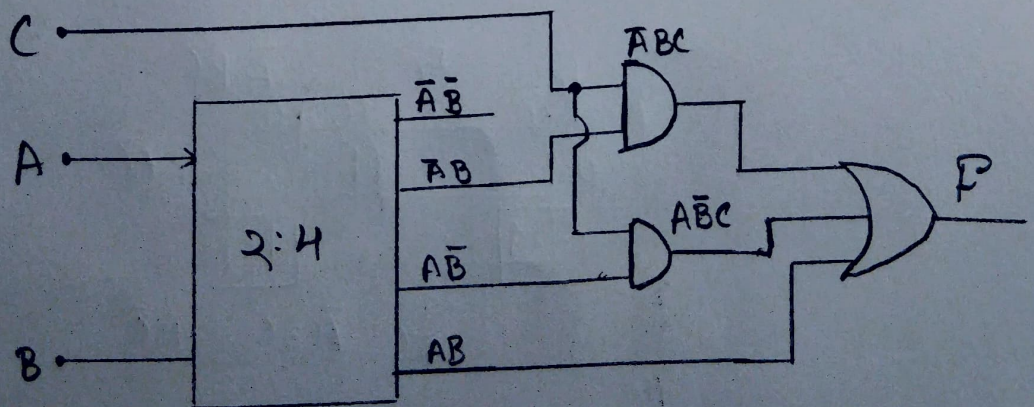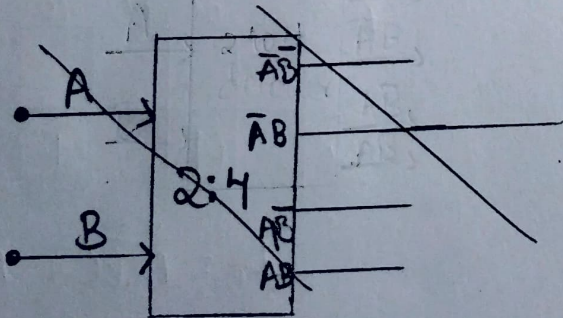
Q3

Present state			Next state			Input to ff		
A	B	C	A^+	B^+	C^+	D_A	D_B	D_C
1	0	0	1	0	1	1	0	1
1	0	1	1	1	0	1	1	0
1	1	0	0	1	1	0	1	1
0	1	1	0	0	1	0	0	1
0	0	1	0	0	0	0	0	0
0	0	0	1	0	0	1	0	0
0	1	0	x	x	x	x	x	x
1	1	1	x	x	x	x	x	x
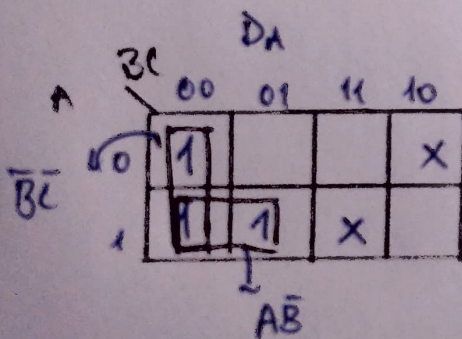
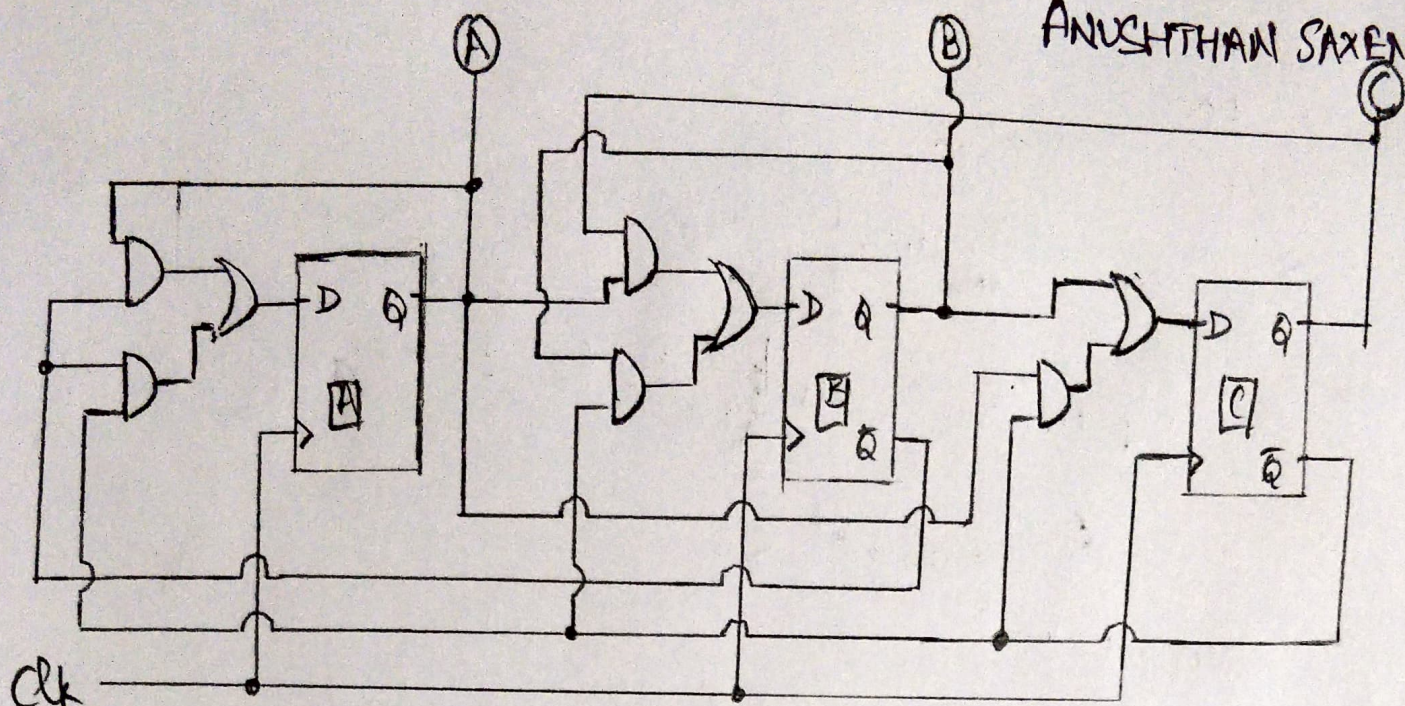$$D_A = A\bar{B} + \bar{B}\bar{C}$$

$$D_B = AC + B\bar{C}$$

$$D_C = B + A\bar{C}$$

3

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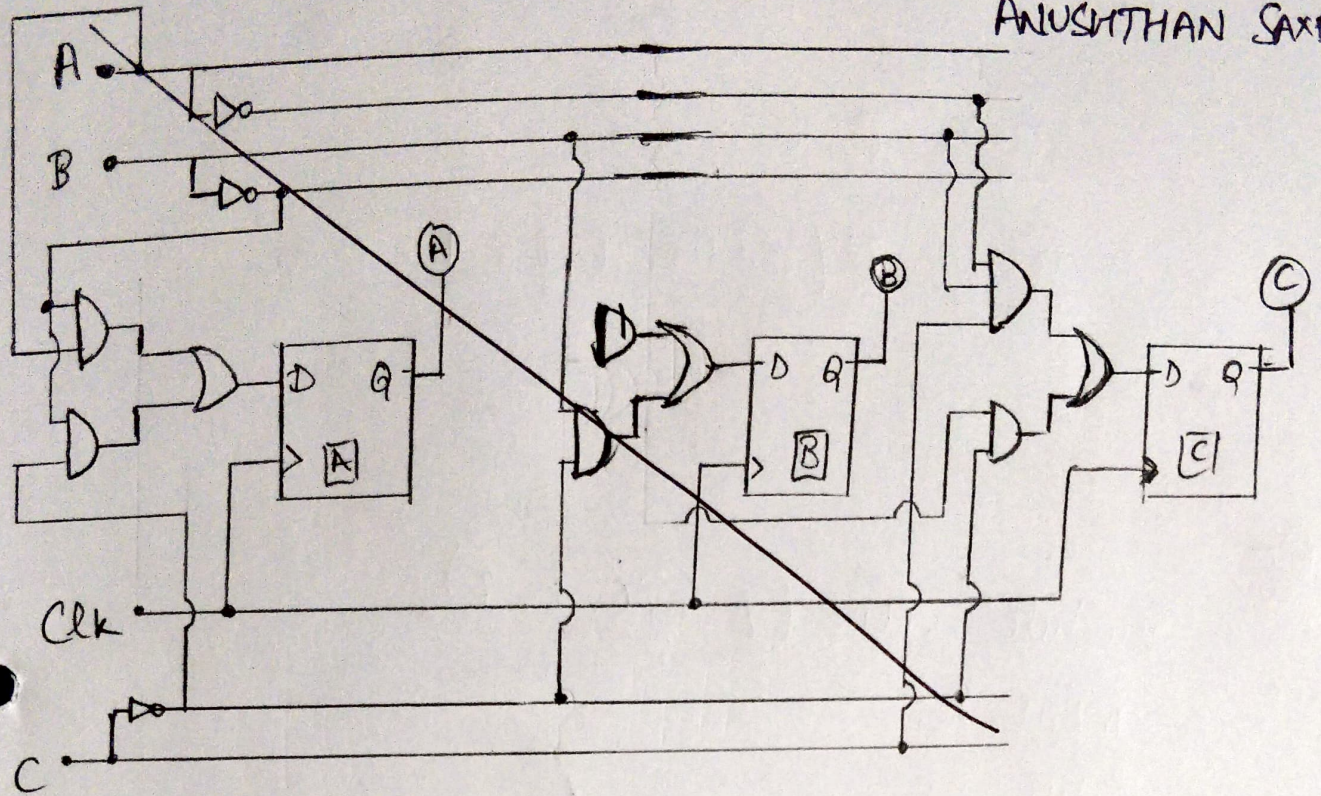
Q4 Determine next state and output

Present → $A(t) = 0$, $B(t) = 1$, input $x(t) = 0$
state

From the circuit,

$$D_A = Ax + Bx \quad , \quad A(t+1) = D_A$$

$$D_B = \bar{A}x \quad , \quad B(t+1) = D_B$$

$$y = \bar{x}(A + B)$$

For $A(t) = 0$, $B(t) = 1$, $\quad \underline{A(t+1)} = 0 \cdot x + 1 \cdot x = x = \underline{0}$

ξ

a) $B(t+1) = \bar{0}.0 = \underline{0}$

$y(t) = \bar{0}.(0+1) = 1.1 = \underline{1}$

Q5

```
module     ans (A, B, C, D, F);
    input A;
    input B;
    input C;
    input D;
    output F;

    F= (B & ~C) | (A & ~B) | (B & ~D) | (A & C);

endmodule
```