

강의	정보처리 필기	강사	조대호
차시 명	[CA-02강] 논리회로-조합논리회로	차시	2차시

학습내용



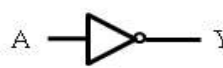

- ☞ 논리회로의 개념
- 논리회로의 논리식 변환

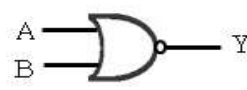

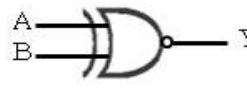
학습목표

- ☞ 논리회로의 개념을 이해 할 수 있다
- 논리회로의 논리식 변환을 할 수 있다

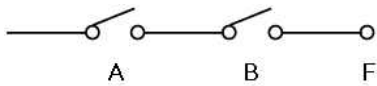
학습내용

1. 논리 게이트의 종류

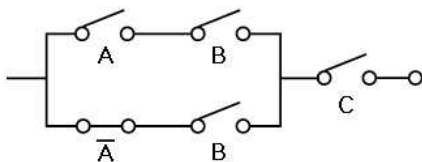
이름	기호	논리식	진리표															
AND		$A \cdot B$	<table><tr><th>A</th><th>B</th><th>Y</th></tr><tr><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td>1</td><td>0</td></tr><tr><td>1</td><td>0</td><td>0</td></tr><tr><td>1</td><td>1</td><td>1</td></tr></table>	A	B	Y	0	0	0	0	1	0	1	0	0	1	1	1
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OR		$A + B$	<table><tr><th>A</th><th>B</th><th>Y</th></tr><tr><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td>1</td><td>1</td></tr><tr><td>1</td><td>0</td><td>1</td></tr><tr><td>1</td><td>1</td><td>1</td></tr></table>	A	B	Y	0	0	0	0	1	1	1	0	1	1	1	1
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NOT		\overline{A}	<table><tr><th>A</th><th>Y</th></tr><tr><td>0</td><td>1</td></tr><tr><td>1</td><td>0</td></tr></table>	A	Y	0	1	1	0									
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이름	기호	논리식	진리표															
NAND		$\overline{A \cdot B}$	<table><tr><th>A</th><th>B</th><th>Y</th></tr><tr><td>0</td><td>0</td><td>1</td></tr><tr><td>0</td><td>1</td><td>1</td></tr><tr><td>1</td><td>0</td><td>1</td></tr><tr><td>1</td><td>1</td><td>0</td></tr></table>	A	B	Y	0	0	1	0	1	1	1	0	1	1	1	0
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NOR		$\overline{A + B}$	<table><tr><th>A</th><th>B</th><th>Y</th></tr><tr><td>0</td><td>0</td><td>1</td></tr><tr><td>0</td><td>1</td><td>0</td></tr><tr><td>1</td><td>0</td><td>0</td></tr><tr><td>1</td><td>1</td><td>0</td></tr></table>	A	B	Y	0	0	1	0	1	0	1	0	0	1	1	0
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XOR		$A \oplus B$	<table><tr><th>A</th><th>B</th><th>Y</th></tr><tr><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td>1</td><td>1</td></tr><tr><td>1</td><td>0</td><td>1</td></tr><tr><td>1</td><td>1</td><td>0</td></tr></table>	A	B	Y	0	0	0	0	1	1	1	0	1	1	1	0
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XNOR		$A \odot B$	<table><tr><th>A</th><th>B</th><th>Y</th></tr><tr><td>0</td><td>0</td><td>1</td></tr><tr><td>0</td><td>1</td><td>0</td></tr><tr><td>1</td><td>0</td><td>0</td></tr><tr><td>1</td><td>1</td><td>1</td></tr></table>	A	B	Y	0	0	1	0	1	0	1	0	0	1	1	1
A	B	Y																
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2. 스위칭 회로

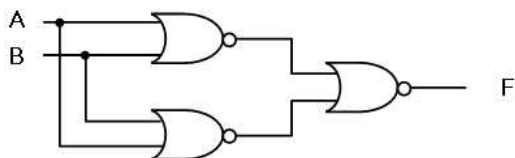


$$F = A \cdot B$$

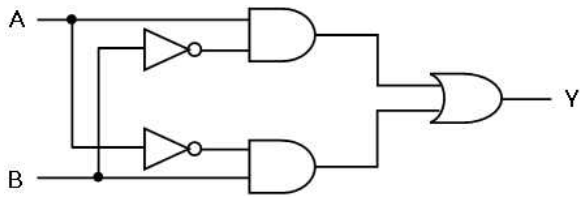


$$(AB + \bar{A}B)C = (A + \bar{A})BC = BC$$

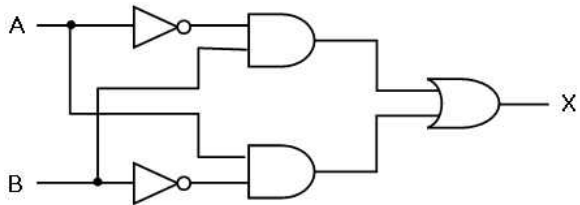
3. 논리식을 논리식으로 표현



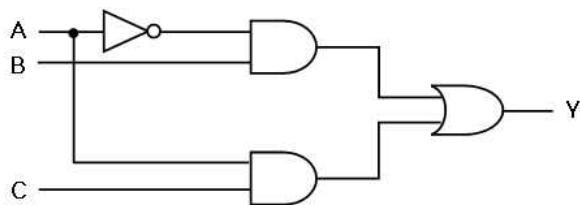
$$F = \overline{\overline{A + B + A + B}} = \overline{\overline{A + B}} \cdot \overline{\overline{A + B}} = A + B \cdot A + B = A + B$$



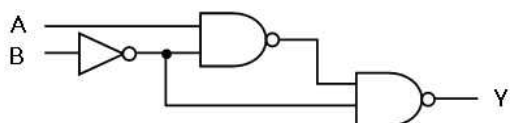
$$Y = A\bar{B} + \bar{A}B = A \oplus B$$



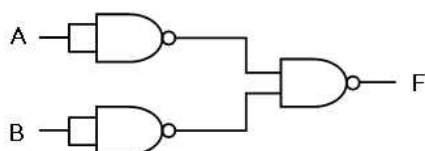
$$X = \bar{A}B + A\bar{B} = A \oplus B$$



$$Y = \bar{A}B + AC$$

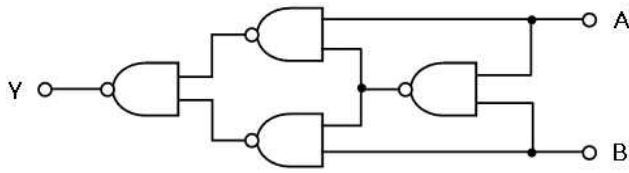


$$Y = \overline{\overline{A}B} = \overline{\overline{A}}\overline{B} + \overline{\overline{B}} = A\bar{B} + B = (A+B)(\bar{B} + B) = (A+B) \cdot 1 = A+B$$



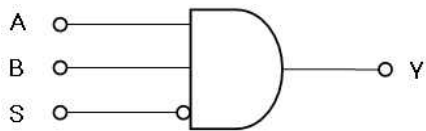
$$F = \overline{\overline{A}A} \cdot \overline{\overline{B}B} = \overline{\overline{A}A} + \overline{\overline{B}B} = AA + BB = A+B$$

4. 논리회로를 논리식으로 표현

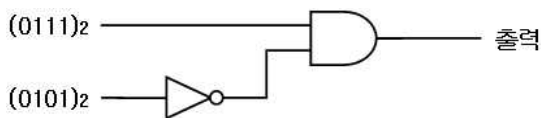


$$\begin{aligned} F &= \overline{(A \cdot \overline{AB})} \cdot \overline{(B \cdot \overline{AB})} = \overline{(A \cdot \overline{AB})} + \overline{(B \cdot \overline{AB})} = (A \cdot \overline{AB}) + (B \cdot \overline{AB}) \\ &= (A \cdot (\overline{A} + \overline{B})) + (B \cdot (\overline{A} + \overline{B})) = (A\overline{A} + B\overline{B}) + (B\overline{A} + A\overline{B}) \\ &= 0 + A\overline{B} + B\overline{A} + 0 = A\overline{B} + \overline{A}B = A \oplus B \end{aligned}$$

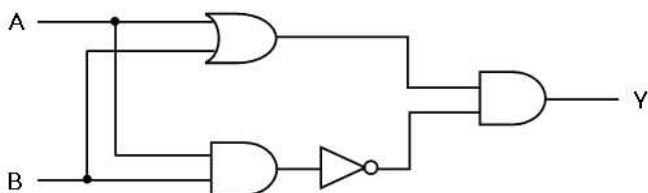
5. 입력값이 주어졌을 때, 출력값 구하기



$$1 \cdot 1 \cdot \overline{1} = 1 \cdot 1 \cdot 0 = 0$$

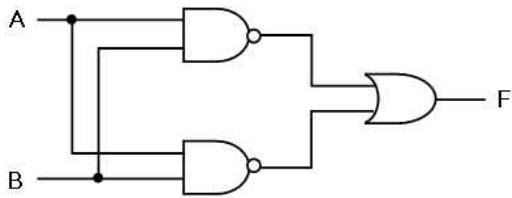


$$0111 \cdot \overline{0101} = 0111 \cdot 1010 = 0010$$



$$(1010 + 1100) \cdot \overline{1010 \cdot 1100} = 1110 \cdot \overline{1000} = 1110 \cdot 0111 = 0110$$

6. 출력값이 주어졌을 때, 입력값 구하기



$$\overline{AB} + \overline{AB} = \overline{AB} = \bar{A} + \bar{B}$$

요점정리

1. 논리회로의 개념을 정리합니다.
2. 논리회로의 논리식 변환을 연습합니다.

다음차시예고

수고하셨습니다. 다음 3주차에서는 “[CA-3강] 논리회로-순서논리회로, 자료의표현”에 대해서 학습하도록 하겠습니다.