

Lösningsförslag till tentamen ETE235 Digitalteknik 2012-10-24

$$\begin{array}{rcl}
 1a) & 219/2 & = 109 \quad \text{REST } 1 \\
 & 109/2 & = 54 \quad \text{REST } 1 \\
 & 54/2 & = 27 \quad \text{REST } 0 \\
 & 27/2 & = 13 \quad \text{REST } 1 \\
 & 13/2 & = 6 \quad \text{REST } 1 \\
 & 6/2 & = 3 \quad \text{REST } 0 \\
 & 3/2 & = 1 \quad \text{REST } 1 \\
 & 1/2 & = 0 \quad \text{REST } 1
 \end{array}$$

LÄSRIKTNING ↑

$$219_{10} = 11011011_2$$

$$1b) \quad \underbrace{10111110}_2 = BE_{16}$$

$$1c) \quad \underbrace{10111110}_2 = 276_8$$

$$\begin{aligned}
 1d) \quad & 2^7 + 2^5 + 2^4 + 2^3 + 2^2 + 2^1 = \\
 & = 190_{10}
 \end{aligned}$$

$$1e) \quad 190_{10} = 000110010000_{BCD}$$

$$\begin{array}{rcl}
 1f) & 0,59375 \cdot 2 & = 0,1875 + 1 \\
 & 0,1875 \cdot 2 & = 0,375 + 0 \\
 & 0,375 \cdot 2 & = 0,75 + 0 \\
 & 0,75 \cdot 2 & = 0,5 + 1 \\
 & 0,5 \cdot 2 & = 0 + 1
 \end{array}$$

LÄSRIKTNING ↓

$$0,59375_{10} = 0,10011_2$$

1g)

10101110

↑

TECKENBIT

0 = POSITIVT TAL

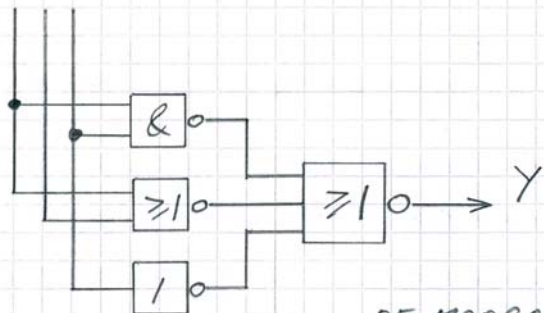
1 = NEGATIVT TAL

$$\begin{array}{r} 10101110 \\ - \quad \quad \quad 1 \\ \hline 10101101 \end{array}$$

$$01010010_2 = 82_{10}$$

ALLTSÅ 10101110 ENLIGT
TVÅKOMPLEMENTMETODEN
MOTSVARAR TALET -82

2a) ABC

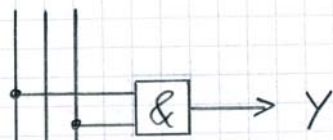


DE MORGANS TEOREM

2b)

$$\begin{aligned} Y &= \overline{\overline{AC} + (\overline{A+B}) + \overline{C}} \quad \downarrow \\ &= \underbrace{AC}_{AC} + \underbrace{ACBC}_{ABC} = AC(1+B) = AC \end{aligned}$$

ABC



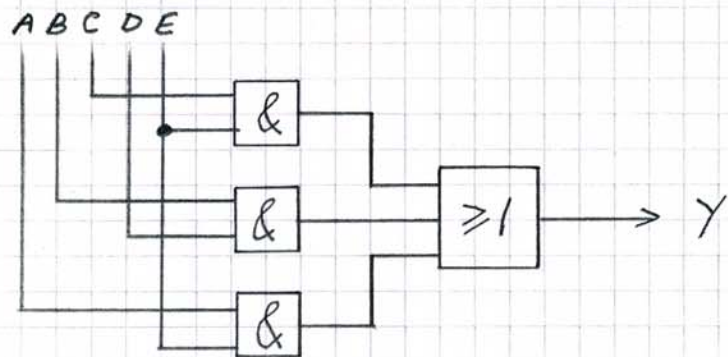
3a)

		DE				DE				
		00	01	11	10	00	01	11	10	
BC	00	0	0	0	0	0	1	1	0	00
	01	0	1	1	0	0	1	1	0	01
	11	0	1	1	1	0	1	1	0	11
	10	0	0	1	1	0	1	1	1	10

$A = 0$

$A = 1$

$$Y = CE + BD + AE$$

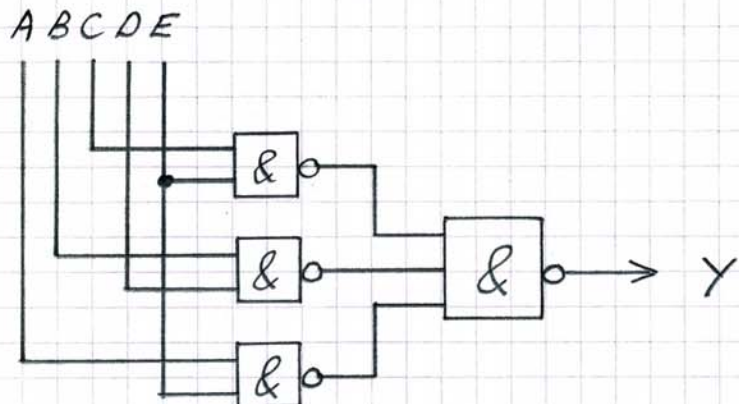


3b/

$$Y = CE + BD + AE =$$

$$= \overline{\overline{CE + BD + AE}} =$$

$$= \overline{\overline{CE} \cdot \overline{BD} \cdot \overline{AE}}$$



$$4. \quad T = Q_B Q_C$$

$$J = 1 \quad K = Q_C$$

$$D = Q_A + Q_B$$

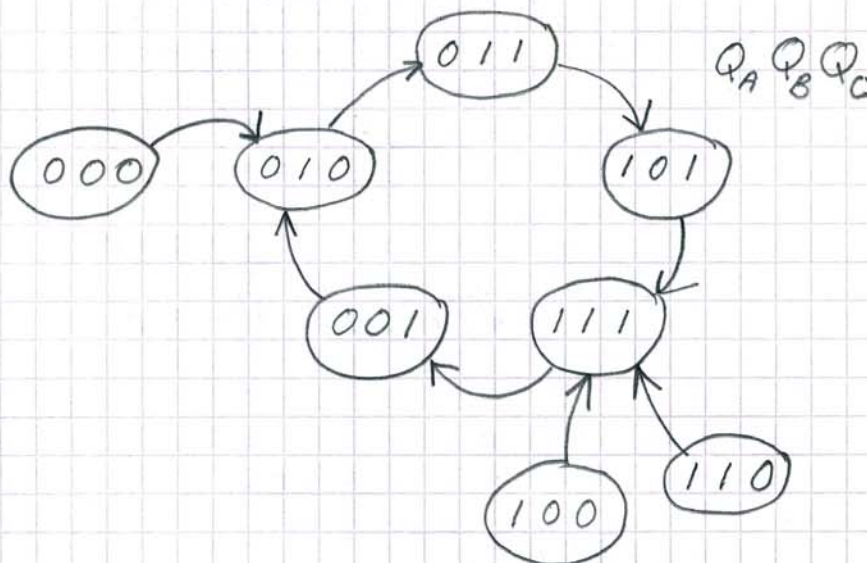
TILLSTÄNDSTABELL

FÖRE CP.

EFTER CP

Q_A	Q_B	Q_C	T	J	K	D	Q_A^+	Q_B^+	Q_C^+
0	0	0	0	1	0	0	0	1	0
0	0	1	0	1	1	0	0	1	0
0	1	0	0	1	0	1	0	1	1
0	1	1	1	1	1	1	1	0	1
1	0	0	0	1	0	1	1	1	1
1	0	1	0	1	1	1	1	1	1
1	1	0	0	1	0	1	1	1	1
1	1	1	1	1	1	1	0	0	1

TILLSTÄNDSGRAF



5. TILLSTANDSTABELL

FÖRE CP

EFTER CP

A	Q_A	Q_B	S_A	R_A	S_B	R_B	Q_A^+	Q_B^+
0	0	0	0	-	0	-	0	0
0	0	1	0	-	-	0	0	1
0	1	0	-	0	0	-	1	0
0	1	1	-	0	-	0	1	1
1	0	0	1	0	1	0	1	1
1	0	1	0	-	0	1	0	0
1	1	0	0	1	1	0	0	1
1	1	1	-	0	0	1	1	0

$Q_A Q_B$

A	00	01	11	10
0	0	0	-	-
1	1	0	-	0

$$S_A = A \bar{Q}_A \bar{Q}_B$$

$Q_A Q_B$

A	00	01	11	10
0	-	-	0	0
1	0	-	0	1

$$R_A = A Q_A \bar{Q}_B$$

$Q_A Q_B$

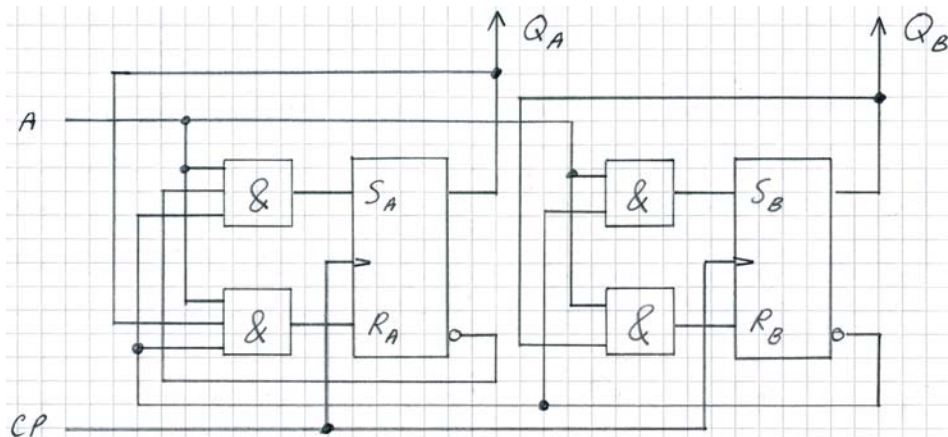
A	00	01	11	10
0	0	-	-	0
1	1	0	0	1

$$S_B = A \bar{Q}_B$$

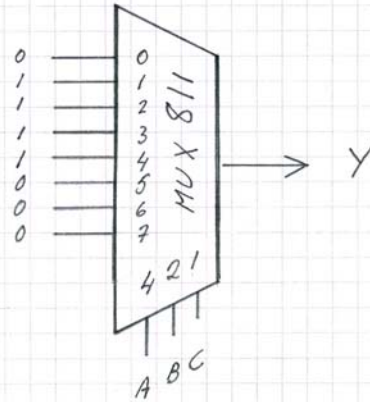
$Q_A Q_B$

A	00	01	11	10
0	-	0	0	-
1	0	1	1	0

$$R_B = A Q_B$$

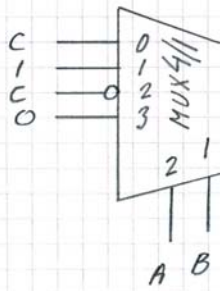


6a)



6b)

A	B	C	Y	
0	0	0	0	} AB=00 → Y=C
0	0	1	1	
0	1	0	1	} AB=01 → Y=1
0	1	1	1	
1	0	0	1	} AB=10 → Y=C̄
1	0	1	0	
1	1	0	0	} AB=11 → Y=0
1	1	1	0	



6c)

A	BC	00	01	11	10
0		0	1	1	1
1		1	1	0	0

$$\overline{Y} = \overline{A}\overline{B}\overline{C} + AC + AB$$

$$Y = \overline{\overline{A}\overline{B}\overline{C} + AC + AB} = \overline{\overline{A}\overline{B}\overline{C}} \cdot \overline{AC} \cdot \overline{AB}$$

