Министерство образования Республики Беларусь Учреждение образования "Белорусский государственный университет информатики и радиоэлектроники"

Кафедра интеллектуальных информационных технологий

Лабораторная работа 5

«Синтез цифровых автоматов»

Выполнил Васильков Е. Д.

студент группы 121703

Проверил Жук А. А.

q1	q2	q3	q4	Такт	q1- prev	q2- prev	q3- prev	q4- prev	H1	H2	Н3	H4
0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	0	0	0	0	1	1	1	1
1	1	1	1	0	1	1	1	1	0	0	0	0
0	1	1	1	1	1	1	1	1	1	0	0	0
0	1	1	1	0	0	1	1	1	0	0	0	0
1	0	1	1	1	0	1	1	1	1	1	0	0
1	0	1	1	0	1	0	1	1	0	0	0	0
0	0	1	1	1	1	0	1	1	1	0	0	0
0	0	1	1	0	0	0	1	1	0	0	0	0
1	1	0	1	1	0	0	1	1	1	1	1	0
1	1	0	1	0	1	1	0	1	0	0	0	0
0	1	0	1	1	1	1	0	1	1	0	0	0
0	1	0	1	0	0	1	0	1	0	0	0	0
1	0	0	1	1	0	1	0	1	1	1	0	0
1	0	0	1	0	1	0	0	1	0	0	0	0
0	0	0	1	1	1	0	0	1	1	0	0	0
0	0	0	1	0	0	0	0	1	0	0	0	0
1	1	1	0	1	0	0	0	1	1	1	1	1
1	1	1	0	0	1	1	1	0	0	0	0	0
0	1	1	0	1	1	1	1	0	1	0	0	0
0	1	1	0	0	0	1	1	0	0	0	0	0
1	0	1	0	1	0	1	1	0	1	1	0	0
1	0	1	0	0	1	0	1	0	0	0	0	0
0	0	1	0	1	1	0	1	0	1	0	0	0
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1	1	0	0	0	1	1	0	0	0	0	0	0
0	1	0	0	1	1	1	0	0	1	0	0	0
0	1	0	0	0	0	1	0	0	0	0	0	0
1	0	0	0	1	0	1	0	0	1	1	0	0
1	0	0	0	0	1	0	0	0	0	0	0	0
0	0	0	0	1	1	0	0	0	1	0	0	0

Цель: синтезировать схему двоичного счетчика вычитающего типа на 16 внутренних состояний в базисе НЕ-И ИЛИ и Т-триггер

По заданной таблице истинности строим 4 СДНФ по колонкам Н1, Н2, Н3, Н4.

(!q1&!q2&!q3&!q4&q5)|(q1&q2&q3&q4&q5)|(!q1&q2&q3&q4&q5)|(!q1&!q2&q3&q4&q5)|(!q1&!q2&!q3&q4&q5)|(!q1&!q2&!q3&q4&q5)|(!q1&!q2&!q3&q4&q5)|(!q1&!q2&!q3&q4&q5)|(!q1&!q2&!q3&q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&q3&!q4&q5)|(!q1&!q2&q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&!q5)|(!q1&!q2&!q3&!q4&!q5)|(!q1&!q2&!q3&!q4&!q5)|(!q1&!q2&!q3&!q4&!q5)|(!q1&!q2&!q3&!q4&!q5)|(!q1&!q2&!q3&!q4&!q5)|(!q1&!q2&!q3&!q4&!q5)|(!q1&!q2&!q3&!q4&!q5)|(!q1&!q2&!q3&!q4&!q5)|(!q1&!q2&!q3&!q4&!q5)|(!q1&!q2&!q3&!q4&!q5)|(!q1&!q2&!q3&!q4&!q5)|(!q1&!q2&!q3&!q4&!q5)|(!q1&!q2&!q3&!q4&!q5)|(!q1&!q2&!q3&!q4&!q5)|(!q1&!q2&!q3&!q4&!q5)|(!q1&!q2&!q3&!q4&!q5)|(!q1&!q2&!q3&!q4&!q5)|(!q1&!q2&!q3&!q4&!q5)|(!q1&!q2&!q3&!q4&!q5)|(!q1&!q2&!q3&!q4&!q5)|(!q1&!q2&!q3&!q4&!q5)|(!q1&!q2&!q3&!q4&!q5)|(!q1&!q2&!q3&!q4&!q5)|(!q1&!q2&!q3&!q4&!q5)|(!q1&!q2&!q3&!q4&!q5)|(!q1&!q2&!q3&!q4&!q5)|(!q1&!q2&!q3&!q4&!q5)|(!q1&!q2&!q3&!q4&!q5)|(!q1&!q2&!q3&!q4&!q5)|(!q1&!q2&!q3&!q4&!q5)|(!q1&!q2&!q3&!q4&!q5)|(!q1&!q2&!q

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—> q5
Расчётный метод
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PONF --- (!AS!BB:CS:10GF)|(ASBCCS0GF)|(ASBCCS0GF)|(ASIBCCS0GF)|(ASIBCCS0GF)|(ASBCCS0GF)|(ASBCCS0GF)|(ASIBCCS0GF)|(ASIBCCS0GF)|(ASIBCCS0GF)|(ASIBCCS0GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASIBCCS10GF)|(ASI

(!q1&!q2&!q3&!q4&q5)|(!q1&q2&q3&q4&q5)|(!q1&!q2&q3&q4&q5)|(!q1&!q2&!q3&q4&q5)|(!q1&!q2&!q3&q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q3&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q2&!q3&!q4&q5)|(!q1&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q4&!q5)|(!q1&!q3&!q3&!q5)|(!q1&!q3&!q5)|(!q1&!q5&!q5)|(!q1&!q5&!q5)|(!q1&!q5&!q5)|(!q1&!q5)|(!q1&!q5&!q5)|(

```
PDNF --- (!A&:B&:C&:D&F)|(!A&B&CCGDF)|(!A&:B&CCGDF)|(!A&:B&CCGDF)|(!A&:B&CCGDF)|(!A&:B&CCGDF)|(!A&:B&CCGDF)|(!A&:B&CCGDF)|(!A&:B&CCGDF)|(!A&:B&CCGDF)|(!A&:B&CCGDF)|(!A&:B&CCGDF)|(!A&:B&CCGDF)|(!A&:B&CCGDF)|(!A&:B&CCGDF)|(!A&:B&CCGDF)|(!A&:B&CCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!A&:BCGCGDF)|(!AC:BCGCGDF)|(!AC:BCGCGDF)|(!AC:BCGCGDF)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:BCGCGGT)|(!AC:B
```

 $\frac{(!q1\&!q2\&!q3\&!q4\&q5)|(!q1\&!q2\&q3\&q4\&q5)|(!q1\&!q2\&!q3\&q4\&q5)|(!q1\&!q2\&q3\&!q4\&q5)}{(!q1\&!q2\&q5)}$

```
Расчетный метод

PDNF --- (!A&!B&!C&!D&F)|(!A&!B&C&D&F)|(!A&!B&!C&D&F)|(!A&!B&C&!D&F)

PDNF after gluing:[[!A, !B, !D, F], [!A, !B, D, F], [!A, !B, C, F], [!A, !B, !C, F]]

PDNF after gluing:[[!A, !B, F]]

PDNF: (!A&!B&F)
```

 $(!q1\&!q2\&!q3\&!q4\&q5)|(!q1\&!q2\&!q3\&q4\&q5) \longrightarrow (!q1\&!q2\&!q3\&q5)$

```
Pacчетный метод

PDNF --- (!A&!B&!C&!D&F)|(!A&!B&!C&D&F)

PDNF after gluing:[[!A, !B, !C, F]]

PDNF after gluing:[[!A, !B, !C, F]]

PDNF: (!A&!B&!C&F)
```

Пример схемы

