Ковалев Р.Б || ИСУ 466200 || Курсовая ч. 2 || Вариант 26

Таблица истинности для операции C = (A - 1) mod 29

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Минимизация булевых функций системы с помощью карт Карно

Карта Карно для С1, при а1 = всех а1

	00	01	11	10
00	1	1	1	1
01	1	1	1	1
11	1	1	1	d
10	1	1	1	d

Карта Карно для С2, при а1 = всех а1

	00	01	11	10
00	1	d	d	1
01	d	d	1	1
11	d	d	1	1
10	d	d	1	1

Карта Карно для С3, при а1 = всех а1

	00	01	11	10
00	1	d	1	d
01	d	1	d	1
11	d	1	d	1
10	d	1	d	1

Карта Карно для С4, при а1 = всех а1

	00	01	11	10
00	1	1	1	1
01	d	d	d	d
11	d	d	d	d
10	1	1	1	1

Карта Карно для С5, при а1 = всех а1

	00	01	11	10
00	1	1	1	1
01	d	d	d	d
11	1	1	1	1
10	d	d	d	1

Система булевых функций

 $C1 = a1 \wedge a2 \wedge b1 \wedge b2$

```
C2 = (b1 v (a1 v a2) л (a1 v a3) л (a1 v b2) л (¬a1 v a2 v ¬b2))
C3 = (a1 v b1) л (a2 v b2) л (a1 v a3 v ¬b2) л (¬a1 v a2 v a3 v ¬b1 v b2)
C4 = (a2 v a3) л (a2 v b1) л (a3 v b2) л (¬a2 v a3 v ¬b1 v b2)
C5 = a3 л b2
Общее значение S_Q = 50
```

Преобразование минимальных форм булевых функций системы

Разделенная факторизация системы

Функции системы:

- 1. $C_1 = a_1 \wedge a_2 \wedge b_1 \wedge b_2$
- 2. $C_2 = (b_1 \lor (a_1 \lor a_2) \land (a_1 \lor a_3) \land (a_1 \lor b_2) \land (\neg a_1 \lor a_2 \lor \neg b_2))$
- 3. $C_3 = (a_1 \lor b_1) \land (a_2 \lor b_2) \land (a_1 \lor a_3 \lor \neg b_2) \land (\neg a_1 \lor a_2 \lor a_3 \lor \neg b_1 \lor b_2)$
- 4. $C_4 = (a_2 \lor a_3) \land (a_2 \lor b_1) \land (a_3 \lor b_2) \land (\neg a_2 \lor a_3 \lor \neg b_1 \lor b_2)$
- 5. $C_5 = a_3 \wedge b_2$

Стоимость функций после разделенной факторизации:

$$C_1 = a_1 \wedge a_2 \wedge b_1 \wedge b_2$$
, $S(C_1) = 4$

$$C_2 = (b_1 \lor \phi_1) \land (a_1 \lor a_3) \land (a_1 \lor b_2)$$
, где $\phi_1 = a_1 \lor a_2 \lor \neg b_2$, $S(C_2) = 12$

$$C_3 = (\phi_2 \lor \neg b_1 \lor b_2) \land (a_1 \lor b_1)$$
, где $\phi_2 = a_1 \lor a_3 \lor \neg b_2$, $S(C_3) = 16$

$$C_4 = (\neg a_2 \lor \varphi_3) \land (a_2 \lor a_3)$$
, где $\varphi_3 = b_1 \lor b_2$, $S(C_4) = 13$

$$C_5 = a_3 \wedge b_2$$
, $S(C_5) = 2$

Общая стоимость системы: S_Q = 47

Совместная декомпозиция системы

Введем общую функцию: $\phi_0 = a_1 \land b_2$, $\neg \phi_0 = \neg a_1 \lor \neg b_2$

После совместной декомпозиции функции примут вид:

$$C_1 = \phi_0 \wedge b_1$$

$$C_2 = (\neg \varphi_0 \lor a_2) \land (a_1 \lor a_3)$$

$$C_3 = (\phi_0 \vee a_3) \wedge (\neg b_1 \vee b_2)$$

$$C_4 = (a_2 \lor \varphi_0) \land (\neg a_2 \lor b_1)$$

$$C_5 = a_3 \wedge b_2$$

Общая стоимость системы: S_Q = 43

Синтез многовыходной комбинационной схемы в булевом базисе

