Федеральное государственное автономное образовательное учреждение высшего образования «Национальный исследовательский университет ИТМО»

**Факультет программной инженерии и компьютерной техники**

**Дискретная математика**

Курсовая работа. Часть 2

Выполнил: Герасимов Артём Кириллович

Группа: P3108

Вариант: 26

Преподаватель: Поляков Владимир Иванович

Санкт-Петербург

2021

**Составление таблицы истинности**

C=(А1)mod27 Число входных/выходных переменных: 5/5

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **а1** | **а2** | **а3** | **а4** | **а5** | **c1** | **c2** | **c3** | **c4** | **c5** |
| 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 |
| 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 |
| 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 |
| 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 |
| 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 |
| 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 |
| 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 |
| 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 |
| 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 |
| 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 |
| 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 |
| 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |
| 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 |
| 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 |
| 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 |
| 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 |
| 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 |
| 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 |
| 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 |
| 1 | 1 | 1 | 0 | 1 | d | d | d | d | d |
| 1 | 1 | 1 | 1 | 0 | d | d | d | d | d |
| 1 | 1 | 1 | 1 | 1 | d | d | d | d | d |

Разрядность операндов: 5/-

**Минимизация булевых функций системы**

c1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| a1 = 1 | a2a3 | | | | |
| a4a5 |  | 00 | 01 | 11 | 10 |
| 00 |  | 1 | 1 | 1 |
| 01 | 1 | 1 | d | 1 |
| 11 | 1 | 1 | d | 1 |
| 10 | 1 | 1 | d | 1 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| a1 = 0 | a2a3 | | | | |
| a4a5 |  | 00 | 01 | 11 | 10 |
| 00 | 1 |  |  |  |
| 01 |  |  |  |  |
| 11 |  |  |  |  |
| 10 |  |  |  |  |

c2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| a1 = 1 | a2a3 | | | | |
| a4a5 |  | 00 | 01 | 11 | 10 |
| 00 | 1 |  | 1 |  |
| 01 |  |  | d | 1 |
| 11 |  |  | d | 1 |
| 10 |  |  | d | 1 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| a1 = 0 | a2a3 | | | | |
| a4a5 |  | 00 | 01 | 11 | 10 |
| 00 | 1 |  | 1 |  |
| 01 |  |  | 1 | 1 |
| 11 |  |  | 1 | 1 |
| 10 |  |  | 1 | 1 |

c3



|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| a1 = 0 | a2a3 | | | | |
| a4a5 |  | 00 | 01 | 11 | 10 |
| 00 | 1 |  |  | 1 |
| 01 |  | 1 | 1 |  |
| 11 |  | 1 | 1 |  |
| 10 |  | 1 | 1 |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| a1 = 1 | a2a3 | | | | |
| a4a5 |  | 00 | 01 | 11 | 10 |
| 00 | 1 |  |  | 1 |
| 01 |  | 1 | d |  |
| 11 |  | 1 | d |  |
| 10 |  | 1 | d |  |

c4

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| a1 = 0 | a2a3 | | | | |
| a4a5 |  | 00 | 01 | 11 | 10 |
| 00 |  | 1 | 1 | 1 |
| 01 |  |  |  |  |
| 11 | 1 | 1 | 1 | 1 |
| 10 |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| a1 = 1 | a2a3 | | | | |
| a4a5 |  | 00 | 01 | 11 | 10 |
| 00 | 1 | 1 | 1 | 1 |
| 01 |  |  | d |  |
| 11 | 1 | 1 | d | 1 |
| 10 |  |  | d |  |

c5

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| a1 = 0 | a2a3 | | | | |
| a4a5 |  | 00 | 01 | 11 | 10 |
| 00 |  | 1 | 1 | 1 |
| 01 |  |  |  |  |
| 11 |  |  |  |  |
| 10 | 1 | 1 | 1 | 1 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| a1 = 1 | a2a3 | | | | |
| a4a5 |  | 00 | 01 | 11 | 10 |
| 00 | 1 | 1 | 1 | 1 |
| 01 |  |  | d |  |
| 11 |  |  | d |  |
| 10 | 1 | 1 | d | 1 |

**Преобразование минимальных форм булевых функций системы**

Sq = 70

Sq = 40

TC1=5τ, TC2=4τ, TC3=3τ, TC4=3τ, TC5=3τ, T= max (TC1, TC2, TC3, TC4, ТC5) = 5τ

Анализ схемы:

F(00000) = 11100   
 F(00100) = 00011

