ФГБОУ ВПО «СПбНИУ ИТМО»

*Факультет программной инженерии и компьютерной техники*

*Дисциплина “Основы профессиональной деятельности”*

**Курсовая работа по дискретной математике №2**

**102 вариант**

Выполнил:

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Санкт-Петербург

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|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| № | Операции | Число переменных | | Разрядность | | Знаки | Доп. код | Фиксация переноса, заема, или переполнения | Для операции деления формирование | | Запрещенная нулевая комбинация | |
| Входных | Выходных | A | B | Четного | Остатка | A | B |
| 102 | C = A-2(-B) | 5 | 5 | 4(2) | -(2) | - | - | \* | - | - | - | - |

## Составление таблицы истинности

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Y** | **A1** | **A2** | **A3** | **A4** | **C1** | **C2** | **C3** | **C4** | **V** |
| 0 | 0 | 0 | 0 | 0 | d | d | d | d | d |
| 0 | 0 | 0 | 0 | 1 | d | d | d | d | d |
| 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 |
| 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |
| 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 |
| 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 |
| 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 |
| 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 |
| 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Y** | **A1** | **A2** | **B1** | **B2** | **C1** | **C2** | **C3** | **C4** | **V** |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 |
| 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 |
| 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 |
| 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |

## Минимизация на картах Карно

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 00 | 01 | 11 | 10 |  |  | 00 | 01 | 11 | 10 |
| 00 | d | d |  |  |  | 00 |  | 1 | 1 | 1 |
| 01 |  |  |  |  |  | 01 |  |  | 1 | 1 |
| 11 | 1 | 1 | 1 | 1 |  | 11 |  |  |  |  |
| 10 |  |  | 1 | 1 |  | 10 |  |  | 1 |  |

С1(min) = {01X1X, 011XX, 10X1X, 1X011, 100X1} Sa = 17 Sb = 22

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 00 | 01 | 11 | 10 |  |  | 00 | 01 | 11 | 10 |
| 00 | d | d |  |  |  | 00 |  | 1 | 1 | 1 |
| 01 |  |  | 1 | 1 |  | 01 |  |  | 1 | 1 |
| 11 |  |  | 1 | 1 |  | 11 |  |  |  |  |
| 10 | 1 | 1 |  |  |  | 10 |  |  | 1 |  |

С2(min) = {1X011, 0X00X, 0X11X, 10X1X, 100X1} Sa = 17 Sb = 22

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 00 | 01 | 11 | 10 |  |  | 00 | 01 | 11 | 10 |
| 00 | d | d |  |  |  | 00 |  | 1 |  | 1 |
| 01 | 1 | 1 |  |  |  | 01 |  |  | 1 | 1 |
| 11 | 1 | 1 |  |  |  | 11 | 1 | 1 |  |  |
| 10 | 1 | 1 |  |  |  | 10 | 1 |  | 1 |  |

С3(min) = {X0001, 10X10, 1011X, 11011, X1X00, X110X, 0XX0X} Sa = 25 Sb = 33

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 00 | 01 | 11 | 10 |  |  | 00 | 01 | 11 | 10 |
| 00 | d | d | 1 |  |  | 00 |  | 1 | 1 |  |
| 01 |  | 1 | 1 |  |  | 01 | 1 |  |  | 1 |
| 11 |  | 1 | 1 |  |  | 11 | 1 |  |  | 1 |
| 10 |  | 1 | 1 |  |  | 10 |  | 1 | 1 |  |

С4(min) = {1X1X0, 0XXX1, XX0X1} Sa = 7 Sb = 10

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 00 | 01 | 11 | 10 |  |  | 00 | 01 | 11 | 10 |
| 00 | d | d |  |  |  | 00 |  | 1 | 1 | 1 |
| 01 |  |  |  |  |  | 01 |  |  | 1 | 1 |
| 11 |  |  |  |  |  | 11 |  |  |  |  |
| 10 |  |  |  |  |  | 10 |  |  | 1 |  |

V(min) = {1X011, 10X1X, 100X1} Sa = 11 Sb = 14

C1 = ¬yx1x3 v ¬yx1x2 v y¬x1x3 v y¬x2x3x4 v y¬x1¬x2x4

C2 = y¬x2x3x4 v ¬y¬x2¬x3 v ¬yx2x3 v y¬x1x3 v y¬x1¬x2x4

C3 = ¬x1¬x2¬x3x4 v y¬x1x3¬x4 v y¬x1x2x3 v yx1¬x2x3x4 v x1¬x3¬x4 v x1x2¬x3 v ¬y¬x3

C4 = yx2¬x4 v ¬yx4 v ¬x2x4

V = y¬x2x3x4 v y¬x1x3 v y¬x1¬x2x4

SQ = 17 + 18 + 25 + 7 + 11 = 78

C1​ = ¬yx1​x3​ v ¬yx1​x2​ v y¬x1​x3​ v y¬x2​x4​

C2​ = y¬x2​x3​x4​ v y¬x1​x3​ v ¬yx2​x3​ v ¬y¬x2​¬x3

C3 ​= ¬x1​¬x2​¬x3​x4​ v y¬x1​x3​ v x1​¬x3​¬x4​ v yx1​¬x2​x3​

C4​ = ¬x2​x4​ v yx2​¬x4​ v ¬yx4​

V = y¬x2​x3​x4​ v y¬x1​x3​ v y¬x1​¬x2​x4​

SQ = 10 + 11 + 12 + 6 + 9 = 48

## Анализ многовыходной комбинационной схемы

## Изображение выглядит как План, схематичный, диаграмма, зарисовка Автоматически созданное описание

SQ = 48 TC1 = 6τ, TC2 = 8τ, TC3 = 9τ, TC4 = 5τ, TV = 7τ T = 13τ