**Практическое задание № 4**

1. Для полученной СДНФ или СКНФ функции (практическое задание № 3) найти все минимальные формы методом Квайна-Мак-Класки в ДНФ или КНФ по варианту.
2. Посчитать сложность S полученной функции.

**Ход работы:**

Полученная СДНФ:

**Поиск минимальных ДНФ методом Квайна-Мак-Класки**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| М1 | | | | | | |  | М1н | | | | | | | |  | М1нн | | | | | |
| 1 | 0 | 0 | 0 | 0 | 1 | **˅** |  | 1 | 0 | 0 | 0 | - | 1 | (1,3) |  |  | 0 | 1 | - | 0 | - | (3,8) |
| 8 | 0 | 1 | 0 | 0 | 0 | **˅** |  | 2 | 0 | - | 0 | 0 | 1 | (1,9) |  |  | 0 | 1 | - | 0 | - | (5,7) |
| 16 | 1 | 0 | 0 | 0 | 0 | **˅** |  | 3 | 0 | 1 | 0 | 0 | - | (8,9) | **˅** |  | 1 | 0 | 1 | - | - | (9,15) |
| 3 | 0 | 0 | 0 | 1 | 1 | **˅** |  | 4 | 0 | 1 | 0 | - | 0 | (8,10) |  |  | 1 | 0 | 1 | - | - | (10,13) |
| 9 | 0 | 1 | 0 | 0 | 1 | **˅** |  | 5 | 0 | 1 | - | 0 | 0 | (8,12) | **˅** |  | - | 1 | 1 | - | 1 | (11,19) |
| 10 | 0 | 1 | 0 | 1 | 0 | **˅** |  | 6 | 1 | 0 | - | 0 | 0 | (16,20) |  |  | - | 1 | 1 | - | 1 | (12,16) |
| 12 | 0 | 1 | 1 | 0 | 0 | **˅** |  | 7 | 0 | 1 | - | 0 | 1 | (9,13) | **˅** |  | 1 | - | 1 | - | 1 | (13,19) |
| 20 | 1 | 0 | 1 | 0 | 0 | **˅** |  | 8 | 0 | 1 | 1 | 0 | - | (12,13) | **˅** |  | 1 | - | 1 | - | 1 | (14,17) |
| 13 | 0 | 1 | 1 | 0 | 1 | **˅** |  | 9 | 1 | 0 | 1 | 0 | - | (20,21) | **˅** |  |
| 21 | 1 | 0 | 1 | 0 | 1 | **˅** |  | 10 | 1 | 0 | 1 | - | 0 | (20,22) | **˅** |  |
| 22 | 1 | 0 | 1 | 1 | 0 | **˅** |  | 11 | 0 | 1 | 1 | - | 1 | (13,15) | **˅** |  |
| 15 | 0 | 1 | 1 | 1 | 1 | **˅** |  | 12 | - | 1 | 1 | 0 | 1 | (13,29) | **˅** |  |
| 23 | 1 | 0 | 1 | 1 | 1 | **˅** |  | 13 | 1 | 0 | 1 | - | 1 | (21,23) | **˅** |  |
| 27 | 1 | 1 | 0 | 1 | 1 | **˅** |  | 14 | 1 | - | 1 | 0 | 1 | (21,29) | **˅** |  |
| 29 | 1 | 1 | 1 | 0 | 1 | **˅** |  | 15 | 1 | 0 | 1 | 1 | - | (22,23) | **˅** |  |
| 31 | 1 | 1 | 1 | 1 | 1 | **˅** |  | 16 | - | 1 | 1 | 1 | 1 | (15,31) | **˅** |  |
|  |  |  |  |  |  |  |  | 17 | 1 | - | 1 | 1 | 1 | (23,31) | **˅** |  |
|  |  |  |  |  |  |  |  | 18 | 1 | 1 | - | 1 | 1 | (27,31) |  |  |
|  |  |  |  |  |  |  |  | 19 | 1 | 1 | 1 | - | 1 | (29,31) | **˅** |  |

Мр = { 01-0-, 101--, -11-1, 1-1-1, 000-1, 0-001, 010-0, 10-00, 11-11 }.

Составим таблицу Квайна:

Таблица 4 – Таблица Квайна

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | 1 | 8 | 16 | 3 | 9 | 10 | 12 | 20 | 13 | 21 | 22 | 15 | 23 | 27 | 29 | 31 |  |
| A | 01-0- |  | 1 |  |  | 1 |  | 1 |  | 1 |  |  |  |  |  |  |  | 3 |
| B | 101-- |  |  |  |  |  |  |  | 1 |  | 1 | 1 |  | 1 |  |  |  | 3 |
| C | -11-1 |  |  |  |  |  |  |  |  | 1 |  |  | 1 |  |  | 1 | 1 | 3 |
| D | 1-1-1 |  |  |  |  |  |  |  |  |  | 1 |  |  | 1 |  | 1 | 1 | 3 |
| E | 000-1 | 1 |  |  | 1 |  |  |  |  |  |  |  |  |  |  |  |  | 4 |
| F | 0-001 | 1 |  |  |  | 1 |  |  |  |  |  |  |  |  |  |  |  | 4 |
| G | 010-0 |  | 1 |  |  |  | 1 |  |  |  |  |  |  |  |  |  |  | 4 |
| H | 10-00 |  |  | 1 |  |  |  |  | 1 |  |  |  |  |  |  |  |  | 4 |
| I | 11-11 |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 |  | 1 | 4 |

Таблицу можно упростить:

Таблица 5 – Приведение таблицы Квайна к цикл. остатку

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | 1 | 8 | 16 | 3 | 9 | 10 | 12 | 20 | 13 | 21 | 22 | 15 | 23 | 27 | 29 | 31 |  |
| A | 01-0- |  | 1 |  |  | 1 |  | 1 |  | 1 |  |  |  |  |  |  |  | 3 |
| B | 101-- |  |  |  |  |  |  |  | 1 |  | 1 | 1 |  | 1 |  |  |  | 3 |
| C | -11-1 |  |  |  |  |  |  |  |  | 1 |  |  | 1 |  |  | 1 | 1 | 3 |
| D | 1-1-1 |  |  |  |  |  |  |  |  |  | 1 |  |  | 1 |  | 1 | 1 | 3 |
| E | 000-1 | 1 |  |  | 1 |  |  |  |  |  |  |  |  |  |  |  |  | 4 |
| F | 0-001 | 1 |  |  |  | 1 |  |  |  |  |  |  |  |  |  |  |  | 4 |
| G | 010-0 |  | 1 |  |  |  | 1 |  |  |  |  |  |  |  |  |  |  | 4 |
| H | 10-00 |  |  | 1 |  |  |  |  | 1 |  |  |  |  |  |  |  |  | 4 |
| I | 11-11 |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 |  | 1 | 4 |

Таблица Квайна сократилась до циклического остатка, показывая единственное минимальное решение:

*.*