# ВХІДНІ ДАННІ

Номер залікової книжки: *9303*

Номер залікової книжки у двійковій системі числення: *0010 0100 0101 0111*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |
| 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 |

|  |  |  |  |
| --- | --- | --- | --- |
| ***h*8** | ***h*4** | ***h*2** | **Порядок з’єднання фрагментів** |
| 0 | 0 | 1 | 2, 4, 3 |

|  |  |  |  |
| --- | --- | --- | --- |
| ***h*8** | ***h*7** | ***h*3** | **Логічні умови** |
| 0 | 1 | 1 | X1, X2, not X1, |

|  |  |  |  |
| --- | --- | --- | --- |
| ***h*9** | ***h*4** | ***h*1** | **Послідовність керуючих сигналів** |
| 0 | 0 | 1 | Y1, (Y1 Y2), Y3, (Y4 Y5), У4,У1 |

|  |  |  |
| --- | --- | --- |
| ***h*6** | ***h*2** | **Сигнал, тривалістю 2*t*** |
| 0 | 1 | Y2 |

|  |  |  |
| --- | --- | --- |
| ***h*6** | ***h*5** | **Тригери** |
| 0 | 1 | D |

|  |  |  |  |
| --- | --- | --- | --- |
| ***h*3** | ***h*2** | ***h*1** | **Логічні елементи** |
| 1 | 1 | 1 | 3І-НЕ, 3АБО-НЕ |

|  |  |
| --- | --- |
| ***h*4** | **Тип автомата** |
| 0 | Мілі |

# Частина 1

Cинтез функціональна схема керуючого автомата:

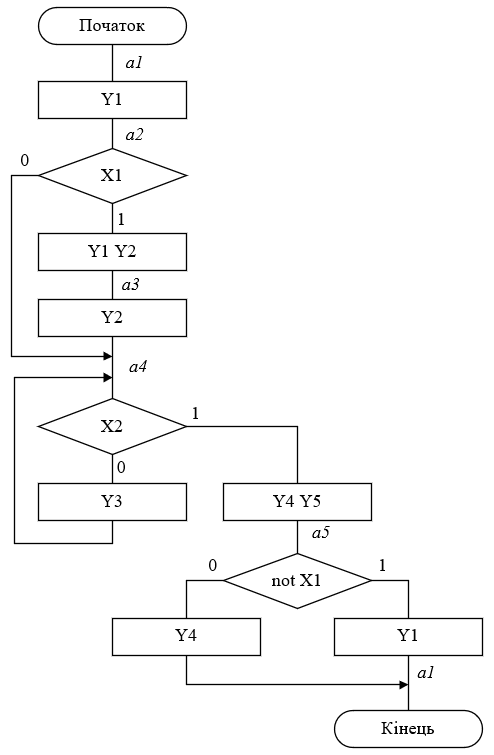


Рис. 1 Граф-схема алгоритму для автомату Мілі

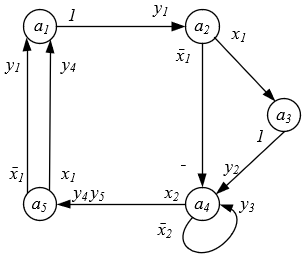


Рис. 2 Граф автомату Мілі

|  |  |  |  |
| --- | --- | --- | --- |
| *Таблиця 1. Пряма таблиця переходів-виходів автомату Мілі* | | | |
|  |  |  |  |
|  |  | 1 |  |
|  |  |  |  |
|  |  | 1 |  |
|  |  |  |  |
|  |  |  |  |

У вихідному автоматі кількість станів , отже, кількість елементів пам'яті:

Кодуємо внутрішні стани автомата, використовуючи для цього карту Карно (рис. 3) і по можливості метод сусіднього кодування.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | |  | | --- | |  | |  | | 01 | 11 | 10 | 00 | | 1 |  |  |  |  | | 0 |  |  |  |  | |  |

Рис. 3 Карта Карно для кодування станів автомата

Будуємо пряму структурну таблицю переходів-виходів автомата Мілі (табл. 2). У даній таблиці в стовпцях і вказується код вихідного стану і стану переходу відповідно.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Таблиця 2. Структурна таблиця переходів-виходів автомата Мілі* | | | | | | | | | | | | | | | | | | |
|  |  | | |  |  | | |  |  |  |  |  |  |  |  |  |  |
|  |  |  |
|  | 0 | 0 | 0 |  | 0 | 0 | 1 | - | - |  |  |  |  | **1** | 0 | 0 | 1 |
|  | 0 | 0 | 1 |  | 0 | 1 | 1 | - | 0 |  |  |  |  |  | 0 | 1 | 1 |
|  | 0 | 0 | 1 |  | 0 | 1 | 0 | - | 1 |  |  |  | **1** |  | 0 | 1 | 0 |
|  | 0 | 1 | 0 |  | 0 | 1 | 1 | - | - |  |  |  | **1** |  | 0 | 1 | 1 |
|  | 0 | 1 | 1 |  | 0 | 1 | 1 | 0 | - |  |  | **1** |  |  | 0 | 1 | 1 |
|  | 0 | 1 | 1 |  | 1 | 0 | 0 | 1 | - | **1** | **1** |  |  |  | 1 | 0 | 0 |
|  | 1 | 0 | 0 |  | 0 | 0 | 0 | - | 0 |  |  |  |  | **1** | 0 | 0 | 0 |
|  | 1 | 0 | 0 |  | 0 | 0 | 0 | - | 1 |  | **1** |  |  |  | 0 | 0 | 0 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | |  |  |  | | --- | --- | --- | |  |  |  | | 0 | 0 | **0** | | 1 | 0 | **0** | | 0 | 1 | **1** | | 1 | 1 | **1** | |

Рис. 4 Таблиця переходів D-тригера

Будуємо діаграми Вейча для всіх функцій:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | | | |  |  |  |  |
|  | **1** | 0 |  |  |  |  | **1** | **1** |  |
| **1** | 0 |  |  |  |  | 0 | 0 |  |
|  | **1** | **1** |  |  | 0 | 0 | **1** | **1** |
|  | **1** | **1** |  |  | 0 | 0 | **1** | **1** |  |
|  |  |  | |  |  |  | |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | | | |  |  |  |  |
|  | **1** | 0 |  |  | ~ | ~ | **1** | **1** |  |
| **1** | 0 |  |  | ~ | ~ | **1** | **1** |  |
|  | **1** | **1** | ~ | ~ | 0 | 0 | 0 | 0 |
|  | **1** | **1** | ~ | ~ | 0 | 0 | 0 | 0 |  |
|  |  |  | |  |  |  | |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | | | |  |  |  |  |
|  | 0 | **1** | ~ |  |  |  | 0 | 0 |  |
| 0 | **1** | ~ |  |  |  | 0 | 0 |  |
|  | 0 | 0 |  |  | 0 | 0 | 0 | 0 |
|  | 0 | 0 |  |  | 0 | 0 | 0 | 0 |  |
|  |  |  | |  |  |  | |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | | | |  |  |  |  |
|  | 0 | 0 |  |  |  |  | 0 | 0 |  |
| 0 | 0 |  |  |  |  | 0 | 0 |  |
|  | 0 | 0 |  |  | 0 | 0 | **1** | **1** |
|  | 0 | 0 |  |  | **1** | **1** | **1** | **1** |  |
|  |  |  | |  |  |  | |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | | | |  |  |  |  |
|  | 0 | 0 |  |  |  |  | 0 | 0 |  |
| 0 | 0 |  |  | ~ | ~ | **1** | **1** |  |
|  | **1** | **1** | ~ | ~ | 0 | 0 | 0 | 0 |
|  | **1** | **1** | ~ | ~ | 0 | 0 | 0 | 0 |  |
|  |  |  | |  |  |  | |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | | | |  |  |  |  |
|  | **1** | 0 |  |  |  |  | 0 | 0 |  |
| **1** | 0 |  |  |  |  | 0 | 0 |  |
|  | 0 | 0 |  |  | 0 | 0 | 0 | 0 |
|  | 0 | 0 |  |  | 0 | 0 | 0 | 0 |  |
|  |  |  | |  |  |  | |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | | | |  |  |  |  |
|  | 0 | **1** | ~ |  |  |  | 0 | 0 |  |
| 0 | **1** | ~ |  | ~ | ~ | 0 | 0 |  |
|  | 0 | 0 |  |  | **1** | **1** | 0 | 0 |
|  | 0 | 0 |  |  | 0 | 0 | 0 | 0 |  |
|  |  |  | |  |  |  | |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | | | |  |  |  |  |
|  | 0 | **1** | ~ |  |  |  | 0 | 0 |  |
| 0 | **1** | ~ |  |  |  | 0 | 0 |  |
|  | 0 | 0 |  |  | 0 | 0 | 0 | 0 |
|  | 0 | 0 |  |  | 0 | 0 | 0 | 0 |  |
|  |  |  | |  |  |  | |  |

Отже отримали наступні функції збудження тригерів:

Функції виходів:

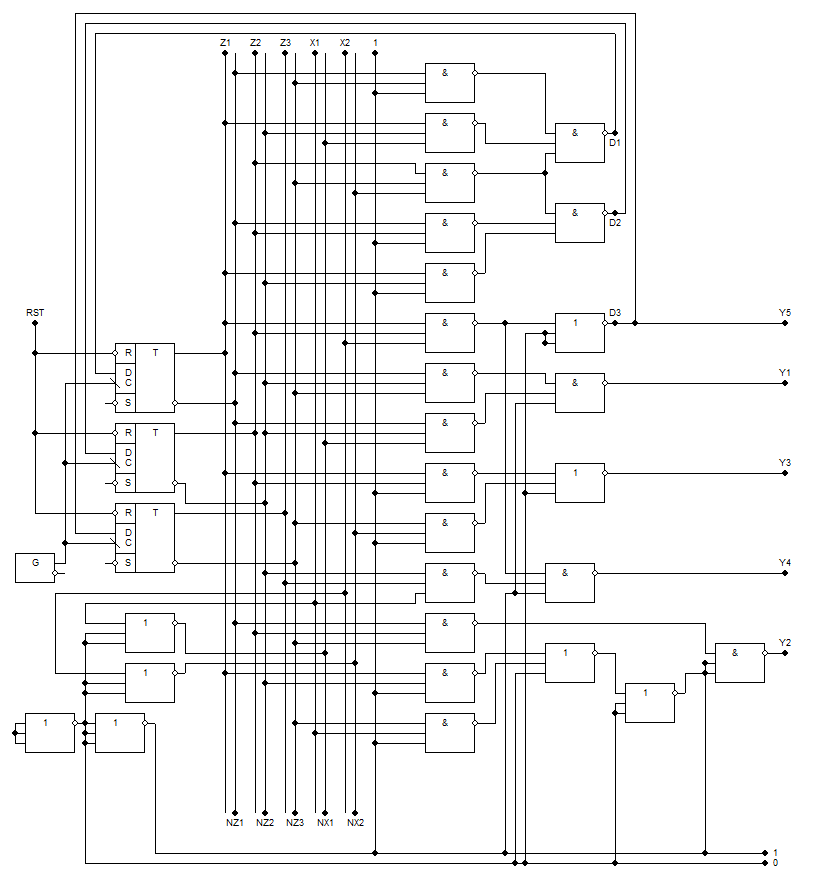


Рис. 5 Функціональна схема автомату Мілі

Побудуємо часову діаграму роботи автомата для кожної комбінацій значень логічних умов.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  |  | | 1 | 1 | 1 | 1 | 1 |  |  | |  |  |  |  |  |  |  |  | | 1 | 1 | 1 | 1 | 1 |  |  | |  |  |  |  |  |  |  |  | | 1 | 0 | 0 | 0 | 0 | 1 |  | |  |  |  |  |  |  |  |  | | 0 | 1 | 1 | 0 | 0 | 0 |  | |  |  |  |  |  |  |  |  | | 0 | 0 | 0 | 0 | 0 | 0 |  | |  |  |  |  |  |  |  |  | | 0 | 0 | 0 | 1 | 1 | 0 |  | |  |  |  |  |  |  |  |  | | 0 | 0 | 0 | 1 | 0 | 0 |  | |  |  |  |  |  |  |  |  | | 0 | 1 | 0 | 1 | 0 | 0 |  | |  |  |  |  |  |  |  |  | | 0 | 0 | 1 | 1 | 0 | 0 |  | |  |  |  |  |  |  |  |  | | 0 | 0 | 0 | 0 | 1 | 0 |  | | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  | | 0 | 0 | 0 | 0 | 0 |  | |  |  |  |  |  |  |  | | 1 | 1 | 1 | 1 | 1 |  | |  |  |  |  |  |  |  | | 1 | 0 | 0 | 1 | 1 |  | |  |  |  |  |  |  |  | | 0 | 0 | 0 | 0 | 0 |  | |  |  |  |  |  |  |  | | 0 | 0 | 0 | 0 | 0 |  | |  |  |  |  |  |  |  | | 0 | 0 | 1 | 0 | 0 |  | |  |  |  |  |  |  |  | | 0 | 0 | 1 | 0 | 0 |  | |  |  |  |  |  |  |  | | 0 | 1 | 1 | 0 | 0 |  | |  |  |  |  |  |  |  | | 0 | 0 | 1 | 0 | 0 |  | |  |  |  |  |  |  |  | | 0 | 0 | 0 | 1 | 0 |  | |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  |  | | 1 | 1 | 1 | 1 | 1 | 1 |  | |  |  |  |  |  |  |  |  | | 0 | 0 | 0 | 0 | 0 | 0 |  | |  |  |  |  |  |  |  |  | | 1 | 0 | 0 | 0 | 0 | 0 |  | |  |  |  |  |  |  |  |  | | 0 | 1 | 1 | 0 | 0 | 0 |  | |  |  |  |  |  |  |  |  | | 0 | 0 | 0 | 1 | 1 | 1 |  | |  |  |  |  |  |  |  |  | | 0 | 0 | 0 | 0 | 0 | 0 |  | |  |  |  |  |  |  |  |  | | 0 | 0 | 0 | 0 | 0 | 0 |  | |  |  |  |  |  |  |  |  | | 0 | 1 | 0 | 1 | 1 | 1 |  | |  |  |  |  |  |  |  |  | | 0 | 0 | 1 | 1 | 1 | 1 |  | |  |  |  |  |  |  |  |  | | 0 | 0 | 0 | 0 | 0 | 0 |  | | |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  |  | | 0 | 0 | 0 | 0 | 0 | 0 |  | |  |  |  |  |  |  |  |  | | 0 | 0 | 0 | 0 | 0 | 0 |  | |  |  |  |  |  |  |  |  | | 1 | 0 | 0 | 0 | 0 | 0 |  | |  |  |  |  |  |  |  |  | | 0 | 0 | 0 | 0 | 0 | 0 |  | |  |  |  |  |  |  |  |  | | 0 | 0 | 1 | 1 | 1 | 1 |  | |  |  |  |  |  |  |  |  | | 0 | 0 | 0 | 0 | 0 | 0 |  | |  |  |  |  |  |  |  |  | | 0 | 0 | 0 | 0 | 0 | 0 |  | |  |  |  |  |  |  |  |  | | 0 | 1 | 1 | 1 | 1 | 1 |  | |  |  |  |  |  |  |  |  | | 0 | 0 | 1 | 1 | 1 | 1 |  | |  |  |  |  |  |  |  |  | | 0 | 0 | 0 | 0 | 0 | 0 |  | |
|  |  |