Міністерство освіти і науки України

Національний технічний університет України

«Київський Політехнічний Інститут імені Ігоря Сікорського»

Факультет прикладної математики

Кафедра «Спеціалізованих комп’ютерних систем»

Лабораторна робота №1

З дисципліни «Комп’ютерна схемотехніка» :

«Проектування комбінаційних схем»

Виконав:

студент III курсу,

група КВ-41

Яковенко Максим

Перевірив:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Київ-2016

***Постановка задачі***

Мета роботи ­– опанувати методику проектування комбінаційних схем у заданому елементному базисі та дослідження їх характеристик.

***Вхідні данні***

Варіант: 21;

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Таблиця 1.2   |  |  |  |  |  | | --- | --- | --- | --- | --- | | X1 | X2 | X3 | X4 | Y | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 1 | 0 | 0 | | 0 | 0 | 1 | 1 | 1 | | 0 | 1 | 0 | 0 | 0 | | 0 | 1 | 0 | 1 | 1 | | 0 | 1 | 1 | 0 | 0 | | 0 | 1 | 1 | 1 | 1 | | 1 | 0 | 0 | 0 | 1 | | 1 | 0 | 0 | 1 | 0 | | 1 | 0 | 1 | 0 | 0 | | 1 | 0 | 1 | 1 | 1 | | 1 | 1 | 0 | 0 | 1 | | 1 | 1 | 0 | 1 | 0 | | 1 | 1 | 1 | 0 | 1 | | 1 | 1 | 1 | 1 | 0 | | Таблиця 1.3   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Входи | | | | Виходи | | | | | | X1 | X2 | X3 | X4 | Z1 | Z2 | Z3 | Z4 | | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | |

Таблиця 1.4

|  |  |  |  |
| --- | --- | --- | --- |
|  | Тип елементів | Кількість елементів у корпусі мікросхеми | Час затримки сигналу *t*, нс |
| 101 | 2І-НЕ  2АБО | 4  4 | 20  22 |

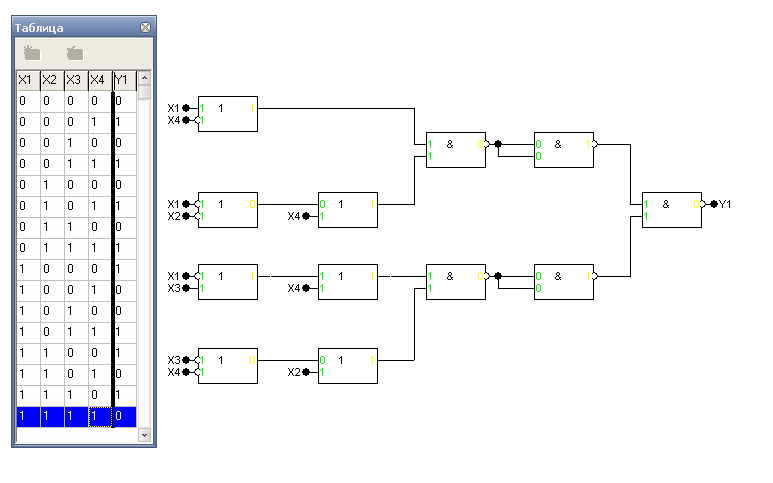
Канонічні форми

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | X1 | |  |  |  |
| X2 | 1 | 0 | 0 | 1 |  |
| 1 | 0 | 1 | 0 | X3 | |
|  | 0 | 1 | 1 | 0 |
|  | 0 | 1 | 1 | 0 |  |
|  |  | X4 | |  |  |

***Операторні форми***

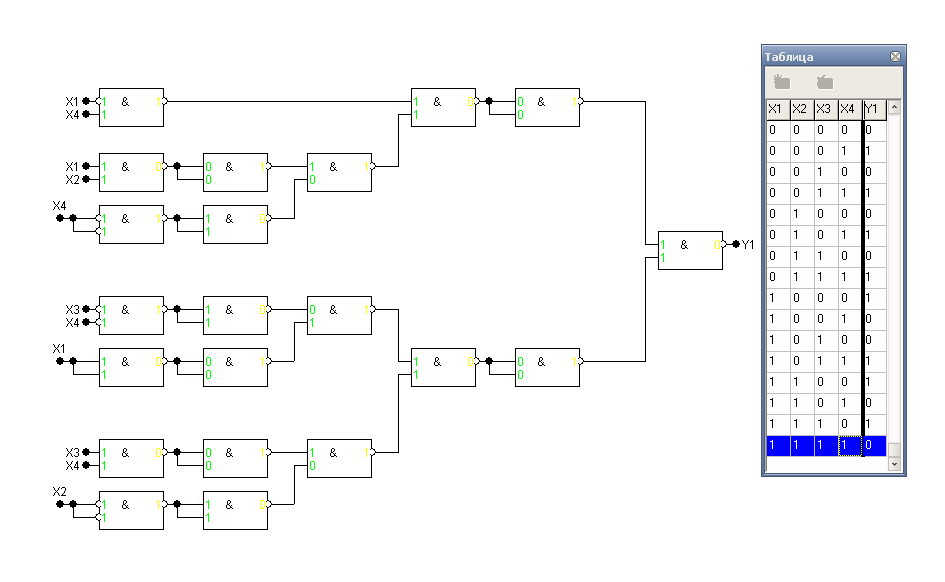
Згідно таблиці 1.4 можливо реалізувати форми: АБО/І-НЕ, І-НЕ / І-НЕ.

Операторна форма АБО/І-НЕ:



N=

T=2AБО+3І-НЕ=2\*22+3\*20=104  
Операторна форма І-НЕ / І-НЕ:



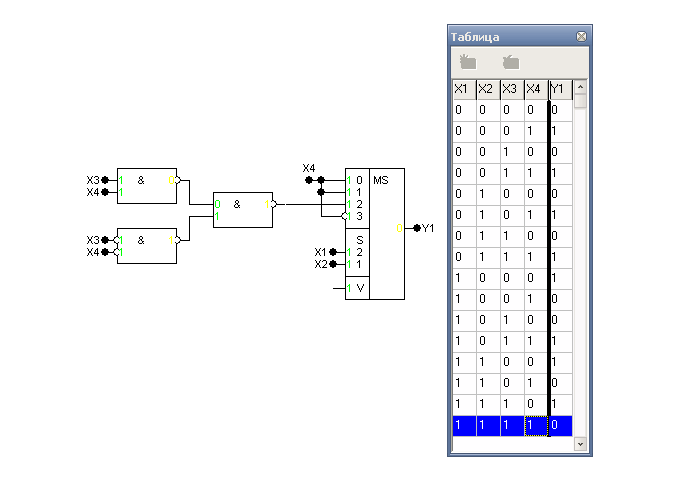
N=

T=6І-НЕ=6\*20=120

***Побудова функції на мультиплексорі***

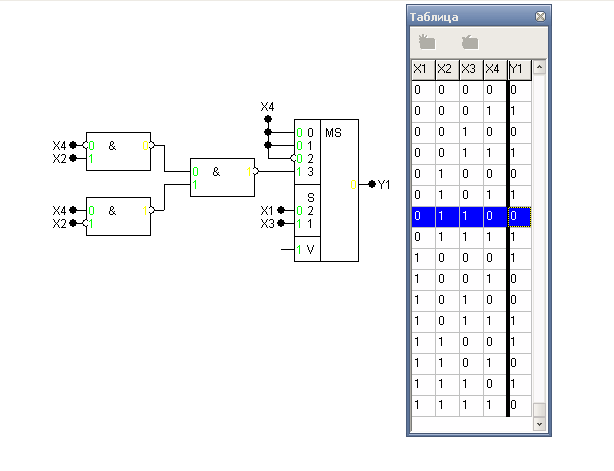
**Розклад за :**





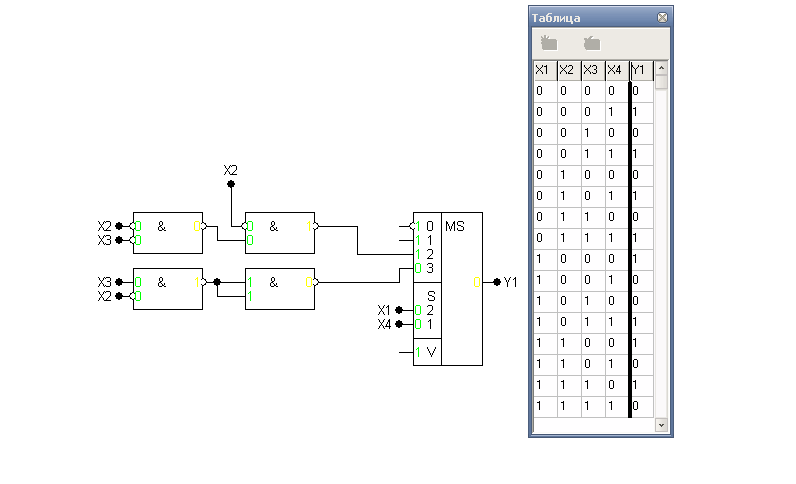
N=  
**Pозклад за :**



  
N=

**Розклад за :**

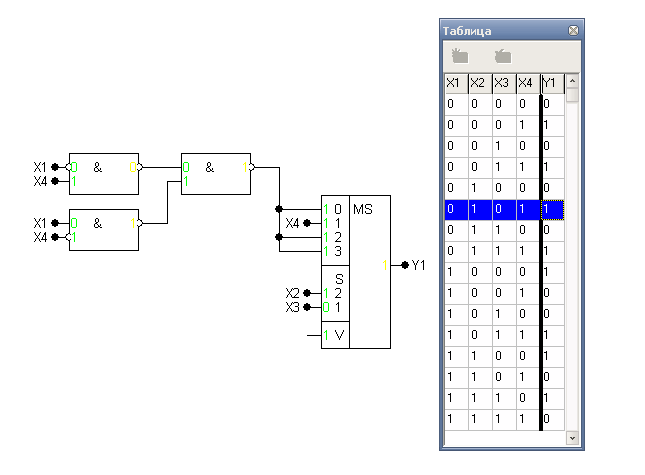




N=

**Розклад за :**

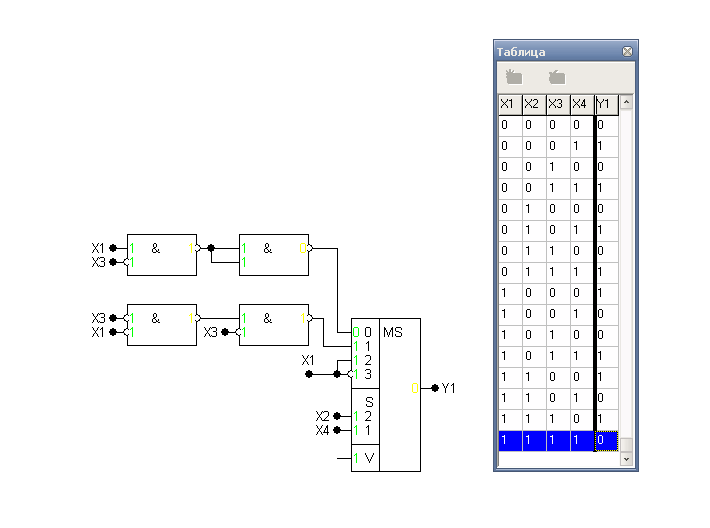




N=

**Розклад за :**

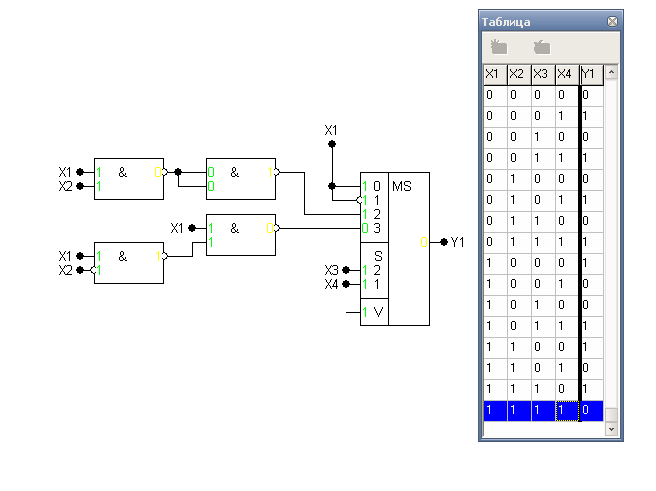




N=

**Розклад за :**

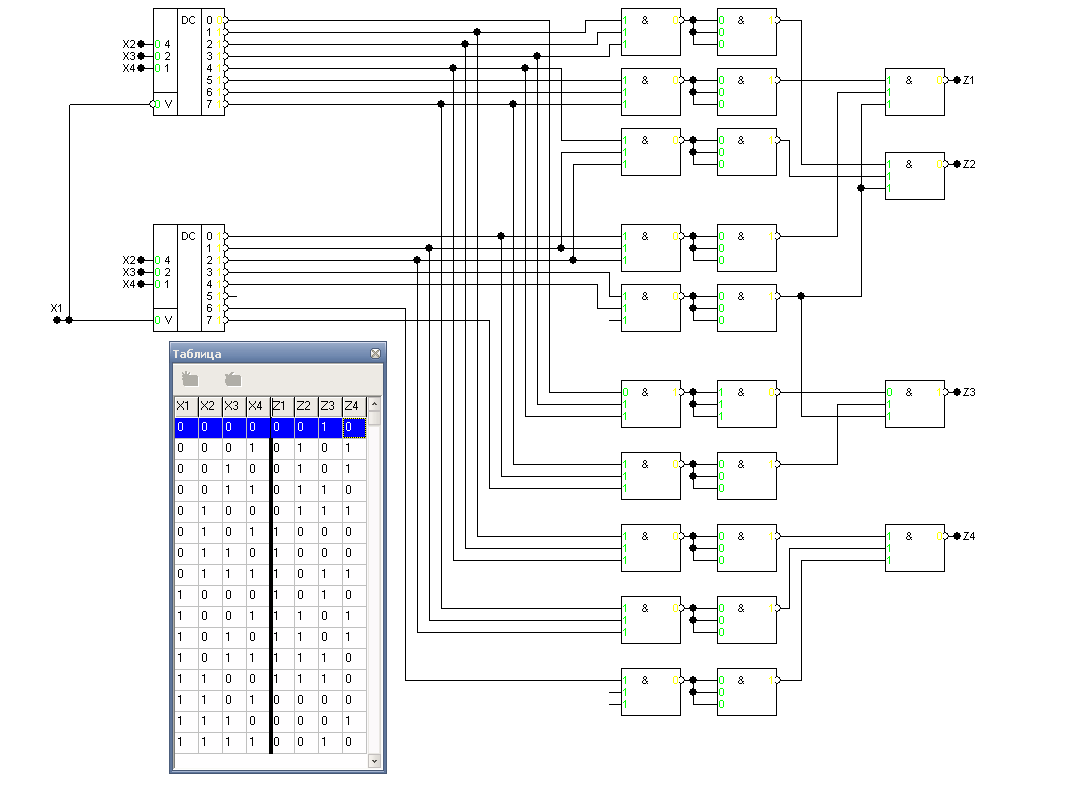




N=

Складність схем за умовними корпусами є однаковою для всіх варіантів.

***Побудова системи на дешифраторі***



N=