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UAS RLD Semester 2

1. Rancanglah sebuah rangkaian logika yang dapat memetakan fungsi matematik f(x) = x - 7; dengan batasan x = {7, 8, …, 15}
2. Mengimplementasikan ide kedalam tabel kebenaran

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| X | A | B | C | D | F(x) | F1 | F2 | F3 | F4 |
| 7 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| 8 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| 9 | 1 | 0 | 0 | 1 | 2 | 0 | 0 | 1 | 0 |
| 10 | 1 | 0 | 1 | 0 | 3 | 0 | 0 | 1 | 1 |
| 11 | 1 | 0 | 1 | 1 | 4 | 0 | 1 | 0 | 0 |
| 12 | 1 | 1 | 0 | 0 | 5 | 0 | 1 | 0 | 1 |
| 13 | 1 | 1 | 0 | 1 | 6 | 0 | 1 | 1 | 0 |
| 14 | 1 | 1 | 1 | 0 | 7 | 0 | 1 | 1 | 1 |
| 15 | 1 | 1 | 1 | 1 | 8 | 1 | 0 | 0 | 0 |

1. Sajikan dalam bentuk sum of product (SOP)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | A | B | C | D | F1 | F2 | F3 | F4 |
| 0 | 0 | 0 | 0 | 0 | d | d | d | d |
| 1 | 0 | 0 | 0 | 1 | d | d | d | d |
| 2 | 0 | 0 | 1 | 0 | d | d | d | d |
| 3 | 0 | 0 | 1 | 1 | d | d | d | d |
| 4 | 0 | 1 | 0 | 0 | d | d | d | d |
| 5 | 0 | 1 | 0 | 1 | d | d | d | d |
| 6 | 0 | 1 | 1 | 0 | d | d | d | d |
| 7 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 |
| 8 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 9 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| 10 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 |
| 11 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 |
| 12 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 |
| 13 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 |
| 14 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 |
| 15 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 |

1. Sederhanakan dengan menggunakan peta K-Map

\*F1 = ABCD

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | A` B` | A` B | A B | A B` |
| C` D` | d⁰ | d4 | 12 | 8 |
| C` D | d1 | d5 | 13 | 9 |
| C D | d2 |  | 1 15 | 11 |
| C D` | d3 | d6 | 14 | 10 |

\*F2 = BC` + BCD` + AB`CD

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | A` B` | A` B | A B | A B` |
| C` D` | d⁰ | d4 | 12 | 8 |
| C` D | d1 | d5 | 13 | 9 |
| C D | d3 | 7 | 15 | 1 11 |
| C D` | d2 | d6 | 14 | 10 |

\*F3 = C` D + C D`

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | A` B` | A` B | A B | A B` |
| C` D` | d⁰ | d4 | 12 | 8 |
| C` D | d1 | d5 | 1 13 | 1 9 |
| C D | d3 | 7 | 15 | 11 |
| C D` | d2 | d6 | 1 14 | 1 10 |

\*F4 = D`

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | A` B` | A` B | A B | A B` |
| C` D` | d⁰ | d4 | 1 12 | 1 8 |
| C` D | d1 | d5 | 13 | 9 |
| C D | d2 | 7 | 15 | 11 |
| C D` | d3 | d6 | 1 14 | 1 10 |

1. Implementasi kedalam rangkaian logika

Diagram

Description automatically generated

1. Perhatikan rangkaian logika dengan 3 input berikut!

Diagram

Description automatically generated

Apabila output S dan R digunakan sebagai input untuk SR flip-flop mode NAND, tentukan:

1. Tabel kebenarannya, memuat input (S, R), output (Q, Q’), dan mode operasi dari tiap-tiap pulsa

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| A | B | C | S | R | Q | Q’ |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 0 | 0 | 1 | 0 | 1 | 1 | 0 |
| 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| 0 | 1 | 1 | 0 | 0 | 1 | 0 |
| 1 | 0 | 0 | 1 | 1 | 1 | 0 |
| 1 | 0 | 1 | 0 | 1 | 1 | 0 |
| 1 | 1 | 0 | 1 | 1 | 1 | 0 |
| 1 | 1 | 1 | 1 | 1 | 1 | 0 |

1. Diagram waktu, memuat input (S, R) dan output (Q, Q’)

Chart, timeline

Description automatically generated

1. Lengkapi gelombang output untuk gambar a dan gambar b disertai dengan penjelasan cara kerjanya!

Diagram

Description automatically generated

\*Jawaban

Chart, box and whisker chart

Description automatically generated

\*Penjelasan:

Gerbang AND memerlukan 2 atau lebih Masukan (Input) untuk menghasilkan hanya 1 Keluaran (Output). Gerbang AND akan menghasilkan Keluaran (Output) Logika 1 jika semua masukan (Input) bernilai Logika 1 dan akan menghasilkan Keluaran (Output) Logika 0 jika salah satu dari masukan (Input) bernilai Logika 0. Simbol yang menandakan Operasi Gerbang Logika AND adalah tanda titik (“.”) atau tidak memakai tanda sama sekali. Contohnya : Z = X.Y atau Z = XY.

1. Carilah Q dan Q’ untuk 2 sinyal berikut!

Shape

Description automatically generated

1. S1=S dan S2=R lalu gambarkan sinyal pewaktuan tepi naik dan tepi turun dan pulsa + serta pulsa - untuk gerbang NOR dan NAND!

A picture containing chart

Description automatically generated

1. S1=S dan S2=R berdetak lalu gambarkan sinyal pewaktuan tepi naik dan tepi turun dan pulsa + serta pulsa - untuk gerbang NOR dan NAND!

A picture containing diagram

Description automatically generated

1. S1=J dan S2K lalu gambarkan sinyal pewaktuan tepi naik dan tepi turun dan pulsa + serta pulsa -!

A picture containing shape

Description automatically generated

1. S2=D lalu gambarkan sinyal pewaktuan tepi naik dan tepi turun dan pulsa + serta pulsa -!

A picture containing diagram

Description automatically generated

1. S2=D berdetak lalu gambarkan sinyal pewaktuan tepi naik dan tepi turun dan pulsa + serta pulsa -!

A picture containing wall, tiled

Description automatically generated

1. S2=T lalu gambarkan sinyal pewaktuan tepi naik dan tepi turun dan pulsa + serta pulsa -!

A picture containing shoji, toilet, bathroom, kitchen appliance

Description automatically generated