3-2

1. А) f (A,B,C) =(0,1,3,5,6,7)
2. (0,0,0) = a2 + a4 + a6 + a10 + a14 + a18 + a19 = 1
3. (0,0,1) = a2 + a4 + a5 + a10 + a12 + a16 + a22 = 1
4. (0,1,0) = a2 + a3 + a6 + a8 + a14 + a17 + a21 = 0
5. (0,1,1) = a2 + a3 + a5 + a8 + a12 + a15 + a23 = 1
6. (1,0,0) = a1 + a4 + a6 + a9 + a13 + a18 + a20 = 0
7. (1,0,1) = a1 + a4 + a5 + a9 + a11 + a16 + a24 = 1
8. (1,1,0) = a1 + a3 + a6 + a7 + a13 + a17 + a25 = 1
9. (1,1,1) = a1 + a3 + a5 + a7 + a11 + a15 + a26 = 1

a10 + a19 = 1

a5 + a10 + a12 + a16 + a22 = 1

a5 + a12 + a15 + a23 = 1

a5 + a11 + a16 + a24 = 1

a7 + a25 = 1

a5 + a7 + a11 + a15 + a26 = 1

a5 = 1; a7 = 1; a10 = 1;

ДНФ: x3 + x1 x2 + !x1!x2 = AB + !A!B + C

|  |  |  |  |
| --- | --- | --- | --- |
| A | B | C | F |
| 0 | 0 | 0 | 1 |
| 0 | 0 | 1 | 1 |
| 0 | 1 | 0 | 0 |
| 0 | 1 | 1 | 1 |
| 1 | 0 | 0 | 0 |
| 1 | 0 | 1 | 1 |
| 1 | 1 | 0 | 1 |
| 1 | 1 | 1 | 1 |

Б) f (A,B,C) =(1,2,5,7)

1. (0,0,0) = a2 + a4 + a6 + a10 + a14 + a18 + a19 = 0
2. (0,0,1) = a2 + a4 + a5 + a10 + a12 + a16 + a22 = 1
3. (0,1,0) = a2 + a3 + a6 + a8 + a14 + a17 + a21 = 1
4. (0,1,1) = a2 + a3 + a5 + a8 + a12 + a15 + a23 = 0
5. (1,0,0) = a1 + a4 + a6 + a9 + a13 + a18 + a20 = 0
6. (1,0,1) = a1 + a4 + a5 + a9 + a11 + a16 + a24 = 1
7. (1,1,0) = a1 + a3 + a6 + a7 + a13 + a17 + a25 = 0
8. (1,1,1) = a1 + a3 + a5 + a7 + a11 + a15 + a26 = 1

a16 + a22 = 1

a21 = 1

a11 + a16 + a24 = 1

a11 + a26 = 1

a11 = 1; a16 = 1; a21 = 1;

ДНФ: x1x3 + !x2x3 + !x1x2!x3 = AC + !BC + !AB!C

|  |  |  |  |
| --- | --- | --- | --- |
| A | B | C | F |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 1 |
| 0 | 1 | 0 | 1 |
| 0 | 1 | 1 | 0 |
| 1 | 0 | 0 | 0 |
| 1 | 0 | 1 | 1 |
| 1 | 1 | 0 | 0 |
| 1 | 1 | 1 | 1 |

1. Мобилизованы внутренние ресурсы = A

Возрастет производительность труда = B

Выполнено задание по валу = C

Внедрена новая техника = D

P1) A -> (B + C) = !A + B + C

P2) D -> C = !D + C

P3) !D -> A!B = D + A!B

D) C

(!A+B+C)(C+!D)(A!B+D) ≡ (!A+B+C)(C+!D)(A+D)(!B+D) ≡

≡ С!D(!A+B)(A+D)(!B+D) ≡ C(!A!D + B!D)(A+D)(!B+D) ≡

≡ С(A+D)(!B+D)

С(A+D)(!B+D) -> C ≡ C -> C ≡ 1 => Выражение - верно

1. Меняется характер собственности = A

Меняются взаимоотношения профсоюзов с администрацией предприятий = B

Меняется содержание деятельности профсоюзов = C

P1) A -> B

P2) B -> C

D) A -> C

A -> B = 1

B -> C = 1

A -> C = 0 => A = 1; C = 0;

P1 = !A + B = 0 + B = 1

P2 = !B + C = !B + 0 = 1

1 -> B = 1 => B = 1

B -> 0 = 1 => B = 1 или B = 0 – противоречие

Противоречие найдено => рассуждение – верно

1. В) f(A,B,C,D)= (0,2,5,6,8,14)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| № | A | B | C | D | F |
| 0 | 0 | 0 | 0 | 0 | 1 |
| 1 | 0 | 0 | 0 | 1 | 0 |
| 2 | 0 | 0 | 1 | 0 | 1 |
| 3 | 0 | 0 | 1 | 1 | 0 |
| 4 | 0 | 1 | 0 | 0 | 0 |
| 5 | 0 | 1 | 0 | 1 | 1 |
| 6 | 0 | 1 | 1 | 0 | 1 |
| 7 | 0 | 1 | 1 | 1 | 0 |
| 8 | 1 | 0 | 0 | 0 | 1 |
| 9 | 1 | 0 | 0 | 1 | 0 |
| 10 | 1 | 0 | 1 | 0 | 0 |
| 11 | 1 | 0 | 1 | 1 | 0 |
| 12 | 1 | 1 | 0 | 0 | 0 |
| 13 | 1 | 1 | 0 | 1 | 0 |
| 14 | 1 | 1 | 1 | 0 | 1 |
| 15 | 1 | 1 | 1 | 1 | 0 |

0000, 0010, 0101, 0110, 1000, 1110

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AB/CD | 00 | 01 | 11 | 10 |
| 00 | 1 | 0 | 0 | 1 |
| 01 | 0 | 1 | 0 | 1 |
| 11 | 0 | 0 | 0 | 1 |
| 10 | 1 | 0 | 0 | 0 |

ДНФ: !B!C!D + !A!B!D + !AB!CD + BC!D

Проверка:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| № | A | B | C | D | F |
| 0 | 0 | 0 | 0 | 0 | 1 |
| 1 | 0 | 0 | 0 | 1 | 0 |
| 2 | 0 | 0 | 1 | 0 | 1 |
| 3 | 0 | 0 | 1 | 1 | 0 |
| 4 | 0 | 1 | 0 | 0 | 0 |
| 5 | 0 | 1 | 0 | 1 | 1 |
| 6 | 0 | 1 | 1 | 0 | 1 |
| 7 | 0 | 1 | 1 | 1 | 0 |
| 8 | 1 | 0 | 0 | 0 | 1 |
| 9 | 1 | 0 | 0 | 1 | 0 |
| 10 | 1 | 0 | 1 | 0 | 0 |
| 11 | 1 | 0 | 1 | 1 | 0 |
| 12 | 1 | 1 | 0 | 0 | 0 |
| 13 | 1 | 1 | 0 | 1 | 0 |
| 14 | 1 | 1 | 1 | 0 | 1 |
| 15 | 1 | 1 | 1 | 1 | 0 |

Минимальная ДНФ найдена верно

Инвертируем карту Карно

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AB/CD | 00 | 01 | 11 | 10 |
| 00 | 0 | 1 | 1 | 0 |
| 01 | 1 | 0 | 1 | 0 |
| 11 | 1 | 1 | 1 | 0 |
| 10 | 0 | 1 | 1 | 1 |

ДНФ: B!C!D + AB!C + !B!CD + !A!BD + AD + CD + A!BC!D

По закону де Моргана преобразуем в КНФ: (!B+C+D)(!A+!B+C)(B+C+!D)(A+B+!D)(!A+!D)(!C+!D)(!A+B+!C+D)

Проверка:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| № | A | B | C | D | F |
| 0 | 0 | 0 | 0 | 0 | 1 |
| 1 | 0 | 0 | 0 | 1 | 0 |
| 2 | 0 | 0 | 1 | 0 | 1 |
| 3 | 0 | 0 | 1 | 1 | 0 |
| 4 | 0 | 1 | 0 | 0 | 0 |
| 5 | 0 | 1 | 0 | 1 | 1 |
| 6 | 0 | 1 | 1 | 0 | 1 |
| 7 | 0 | 1 | 1 | 1 | 0 |
| 8 | 1 | 0 | 0 | 0 | 1 |
| 9 | 1 | 0 | 0 | 1 | 0 |
| 10 | 1 | 0 | 1 | 0 | 0 |
| 11 | 1 | 0 | 1 | 1 | 0 |
| 12 | 1 | 1 | 0 | 0 | 0 |
| 13 | 1 | 1 | 0 | 1 | 0 |
| 14 | 1 | 1 | 1 | 0 | 1 |
| 15 | 1 | 1 | 1 | 1 | 0 |

Минимальная КНФ найдена верно.

Г) f(A,B,C,D)= (0,2,4,5,10,15)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| № | A | B | C | D | F |
| 0 | 0 | 0 | 0 | 0 | 1 |
| 1 | 0 | 0 | 0 | 1 | 0 |
| 2 | 0 | 0 | 1 | 0 | 1 |
| 3 | 0 | 0 | 1 | 1 | 0 |
| 4 | 0 | 1 | 0 | 0 | 1 |
| 5 | 0 | 1 | 0 | 1 | 1 |
| 6 | 0 | 1 | 1 | 0 | 0 |
| 7 | 0 | 1 | 1 | 1 | 0 |
| 8 | 1 | 0 | 0 | 0 | 0 |
| 9 | 1 | 0 | 0 | 1 | 0 |
| 10 | 1 | 0 | 1 | 0 | 1 |
| 11 | 1 | 0 | 1 | 1 | 0 |
| 12 | 1 | 1 | 0 | 0 | 0 |
| 13 | 1 | 1 | 0 | 1 | 0 |
| 14 | 1 | 1 | 1 | 0 | 0 |
| 15 | 1 | 1 | 1 | 1 | 1 |

0000, 0010, 0100, 0101, 1010, 1111

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AB/CD | 00 | 01 | 11 | 10 |
| 00 | 1 | 0 | 0 | 1 |
| 01 | 1 | 1 | 0 | 0 |
| 11 | 0 | 0 | 1 | 0 |
| 10 | 0 | 0 | 0 | 1 |

ДНФ: !A!C!D + !AB!C + !A!B!D + ABCD + !BC!D

Проверка:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| № | A | B | C | D | F |
| 0 | 0 | 0 | 0 | 0 | 1 |
| 1 | 0 | 0 | 0 | 1 | 0 |
| 2 | 0 | 0 | 1 | 0 | 1 |
| 3 | 0 | 0 | 1 | 1 | 0 |
| 4 | 0 | 1 | 0 | 0 | 1 |
| 5 | 0 | 1 | 0 | 1 | 1 |
| 6 | 0 | 1 | 1 | 0 | 0 |
| 7 | 0 | 1 | 1 | 1 | 0 |
| 8 | 1 | 0 | 0 | 0 | 0 |
| 9 | 1 | 0 | 0 | 1 | 0 |
| 10 | 1 | 0 | 1 | 0 | 1 |
| 11 | 1 | 0 | 1 | 1 | 0 |
| 12 | 1 | 1 | 0 | 0 | 0 |
| 13 | 1 | 1 | 0 | 1 | 0 |
| 14 | 1 | 1 | 1 | 0 | 0 |
| 15 | 1 | 1 | 1 | 1 | 1 |

Минимальная ДНФ найдена верно.

Конвертируем карту Карно:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AB/CD | 00 | 01 | 11 | 10 |
| 00 | 0 | 1 | 1 | 0 |
| 01 | 0 | 0 | 1 | 1 |
| 11 | 1 | 1 | 0 | 1 |
| 10 | 1 | 1 | 1 | 0 |

ДНФ: A!C + !A!BD + !BCD + !ACD + BC!D

КНФ: (!A+C)(A+B+!D)(B+!C+!D)(A+!C+!D)(!B+!C+D)

Проверка:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| № | A | B | C | D | F |
| 0 | 0 | 0 | 0 | 0 | 1 |
| 1 | 0 | 0 | 0 | 1 | 0 |
| 2 | 0 | 0 | 1 | 0 | 1 |
| 3 | 0 | 0 | 1 | 1 | 0 |
| 4 | 0 | 1 | 0 | 0 | 1 |
| 5 | 0 | 1 | 0 | 1 | 1 |
| 6 | 0 | 1 | 1 | 0 | 0 |
| 7 | 0 | 1 | 1 | 1 | 0 |
| 8 | 1 | 0 | 0 | 0 | 0 |
| 9 | 1 | 0 | 0 | 1 | 0 |
| 10 | 1 | 0 | 1 | 0 | 1 |
| 11 | 1 | 0 | 1 | 1 | 0 |
| 12 | 1 | 1 | 0 | 0 | 0 |
| 13 | 1 | 1 | 0 | 1 | 0 |
| 14 | 1 | 1 | 1 | 0 | 0 |
| 15 | 1 | 1 | 1 | 1 | 1 |

Минимальная КНФ составлена верно.