**2. Finding Prime Implicants**

| **Group** | **Decimal** | **Binary** |
| --- | --- | --- |
| **0** | **0** | **000000000000 ✓** |
| **1** | **512** | **001000000000 ✓** |
| **1** | **8** | **000000001000 ✓** |
| **2** | **5** | **000000000101 ✓** |
| **2** | **3** | **000000000011 ✹** |
| **2** | **34** | **000000100010 ✓** |
| **3** | **42** | **000000101010 ✓** |
| **3** | **56** | **000000111000 ✹** |
| **3** | **21** | **000000010101 ✓** |
| **4** | **15** | **000000001111 ✹** |
| **4** | **23** | **000000010111 ✓** |
| **4** | **102** | **000001100110 ✹** |
| **4** | **99** | **000001100011 ✹** |
| **5** | **203** | **000011001011 ✹** |

**3. Finding Prime Implicants**

| **Group** | **Decimal** | **Binary** |
| --- | --- | --- |
| **0** | **0, 512** | **00-000000000 ✹** |
| **0** | **0, 8** | **00000000-000 ✹** |
| **1** | **21, 5** | **0000000-0101 ✹** |
| **1** | **34, 42** | **00000010-010 ✹** |
| **2** | **21, 23** | **0000000101-1 ✹** |

**The Prime Implicants Are**

A'B'C'D'E'F'G'H'I'J'KL,

A'B'C'D'E'F'GHIJ'K'L',

A'B'C'D'E'F'G'H'IJKL,

A'B'C'D'E'FGH'I'JKL',

A'B'C'D'E'FGH'I'J'KL,

A'B'C'D'EFG'H'IJ'KL,

A'B'D'E'F'G'H'I'J'K'L',

A'B'C'D'E'F'G'H'J'K'L',

A'B'C'D'E'F'G'I'JK'L,

A'B'C'D'E'F'GH'J'KL',

A'B'C'D'E'F'G'HI'JL

**5. Prime Implicants Chart**

| **Minterms** | **102** | **15** | **203** | **23** | **42** | **5** | **512** | **56** | **Cost** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **A'B'C'D'E'F'GHIJ'K'L'** |  |  |  |  |  |  |  | **X** | **13** |
| **A'B'C'D'E'F'G'H'IJKL** |  | **X** |  |  |  |  |  |  | **13** |
| **A'B'C'D'E'FGH'I'JKL'** | **X** |  |  |  |  |  |  |  | **13** |
| **A'B'C'D'EFG'H'IJ'KL** |  |  | **X** |  |  |  |  |  | **13** |
| **A'B'D'E'F'G'H'I'J'K'L'** |  |  |  |  |  |  | **X** |  | **12** |
| **A'B'C'D'E'F'G'I'JK'L** |  |  |  |  |  | **X** |  |  | **12** |
| **A'B'C'D'E'F'GH'J'KL'** |  |  |  |  | **X** |  |  |  | **12** |
| **A'B'C'D'E'F'G'HI'JL** |  |  |  | **X** |  |  |  |  | **12** |
|  |  |  |  |  |  |  |  |  |  |

**6. Finding Unique Minterms**

| **Minterms** | **102** | **15** | **203** | **23** | **42** | **5** | **512** | **56** | **Cost** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **A'B'C'D'E'F'GHIJ'K'L'** |  |  |  |  |  |  |  | X | **13** |
| **A'B'C'D'E'F'G'H'IJKL** |  | X |  |  |  |  |  |  | **13** |
| **A'B'C'D'E'FGH'I'JKL'** | X |  |  |  |  |  |  |  | **13** |
| **A'B'C'D'EFG'H'IJ'KL** |  |  | X |  |  |  |  |  | **13** |
| **A'B'D'E'F'G'H'I'J'K'L'** |  |  |  |  |  |  | X |  | **12** |
| **A'B'C'D'E'F'G'I'JK'L** |  |  |  |  |  | X |  |  | **12** |
| **A'B'C'D'E'F'GH'J'KL'** |  |  |  |  | X |  |  |  | **12** |
| **A'B'C'D'E'F'G'HI'JL** |  |  |  | X |  |  |  |  | **12** |

**The Essential Implicants Are**

A'B'C'D'E'F'GHIJ'K'L',

A'B'C'D'E'F'G'H'IJKL,

A'B'C'D'E'FGH'I'JKL',

A'B'C'D'EFG'H'IJ'KL,

A'B'D'E'F'G'H'I'J'K'L',

A'B'C'D'E'F'G'I'JK'L,

A'B'C'D'E'F'GH'J'KL',

A'B'C'D'E'F'G'HI'JL

**Possible Function Minimizations**

F = A'B'C'D'E'F'GHIJ'K'L' + A'B'C'D'E'F'G'H'IJKL + A'B'C'D'E'FGH'I'JKL' + A'B'C'D'EFG'H'IJ'KL + A'B'D'E'F'G'H'I'J'K'L' + A'B'C'D'E'F'G'I'JK'L + A'B'C'D'E'F'GH'J'KL' + A'B'C'D'E'F'G'HI'JL