**2. Finding Prime Implicants**

| **Group** | **Decimal** | **Binary** |
| --- | --- | --- |
| **0** | **1** | **0000000000000000001 ✓** |
| **0** | **2** | **0000000000000000010 ✓** |
| **1** | **3** | **0000000000000000011 ✓** |
| **1** | **5** | **0000000000000000101 ✓** |
| **2** | **7** | **0000000000000000111 ✓** |
| **2** | **25** | **0000000000000011001 ✹** |
| **2** | **200** | **0000000000011001000 ✹** |
| **3** | **102** | **0000000000001100110 ✹** |
| **4** | **1000** | **0000000001111101000 ✹** |
| **5** | **511** | **0000000000111111111 ✹** |
| **6** | **77777** | **0010010111111010001 ✹** |

**3. Finding Prime Implicants**

| **Group** | **Decimal** | **Binary** |
| --- | --- | --- |
| **0** | **1, 5** | **0000000000000000-01 ✓** |
| **0** | **1, 3** | **00000000000000000-1 ✓** |
| **0** | **2, 3** | **000000000000000001- ✹** |
| **1** | **3, 7** | **0000000000000000-11 ✓** |
| **1** | **5, 7** | **00000000000000001-1 ✓** |

**4. Finding Prime Implicants**

| **Group** | **Decimal** | **Binary** |
| --- | --- | --- |
| **0** | **1, 3, 5, 7** | **0000000000000000--1 ✹** |

**The Prime Implicants Are**

A'B'C'D'E'F'G'H'I'J'K'L'M'N'OPQ'R'S, A'B'C'D'E'F'G'H'I'J'K'LMN'O'PQ'R'S', A'B'C'D'E'F'G'H'I'J'K'L'MNO'P'QRS', A'B'C'D'E'F'G'H'I'JKLMNO'PQ'R'S', A'B'C'D'E'F'G'H'I'J'KLMNOPQRS, A'B'CD'E'FG'HIJKLMN'OP'Q'R'S, A'B'C'D'E'F'G'H'I'J'K'L'M'N'O'P'Q'R, A'B'C'D'E'F'G'H'I'J'K'L'M'N'O'P'S

**6. Prime Implicants Chart**

| **Minterms** | **1** | **102** | **25** | **3** | **511** | **7** | **77777** | **Cost** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **A'B'C'D'E'F'G'H'I'J'K'L'M'N'OPQ'R'S** |  |  | **X** |  |  |  |  | **36** |
| **A'B'C'D'E'F'G'H'I'J'K'L'MNO'P'QRS'** |  | **X** |  |  |  |  |  | **35** |
| **A'B'C'D'E'F'G'H'I'J'KLMNOPQRS** |  |  |  |  | **X** |  |  | **30** |
| **A'B'CD'E'FG'HIJKLMN'OP'Q'R'S** |  |  |  |  |  |  | **X** | **29** |
| **A'B'C'D'E'F'G'H'I'J'K'L'M'N'O'P'Q'R** |  |  |  | **X** |  |  |  | **36** |
| **A'B'C'D'E'F'G'H'I'J'K'L'M'N'O'P'S** | **X** |  |  | **X** |  | **X** |  | **34** |

**7. Finding Unique Minterms**

| **Minterms** | **1** | **102** | **25** | **3** | **511** | **7** | **77777** | **Cost** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **A'B'C'D'E'F'G'H'I'J'K'L'M'N'OPQ'R'S** |  |  | X |  |  |  |  | **36** |
| **A'B'C'D'E'F'G'H'I'J'K'L'MNO'P'QRS'** |  | X |  |  |  |  |  | **35** |
| **A'B'C'D'E'F'G'H'I'J'KLMNOPQRS** |  |  |  |  | X |  |  | **30** |
| **A'B'CD'E'FG'HIJKLMN'OP'Q'R'S** |  |  |  |  |  |  | X | **29** |
| **A'B'C'D'E'F'G'H'I'J'K'L'M'N'O'P'Q'R** |  |  |  | **X** |  |  |  | **36** |
| **A'B'C'D'E'F'G'H'I'J'K'L'M'N'O'P'S** | X |  |  | **X** |  | X |  | **34** |

**The Essential Implicants Are**

A'B'C'D'E'F'G'H'I'J'K'L'M'N'OPQ'R'S, A'B'C'D'E'F'G'H'I'J'K'L'MNO'P'QRS', A'B'C'D'E'F'G'H'I'J'KLMNOPQRS, A'B'CD'E'FG'HIJKLMN'OP'Q'R'S, A'B'C'D'E'F'G'H'I'J'K'L'M'N'O'P'S

**Possible Function Minimizations**

F = A'B'C'D'E'F'G'H'I'J'K'L'M'N'OPQ'R'S + A'B'C'D'E'F'G'H'I'J'K'L'MNO'P'QRS' + A'B'C'D'E'F'G'H'I'J'KLMNOPQRS + A'B'CD'E'FG'HIJKLMN'OP'Q'R'S + A'B'C'D'E'F'G'H'I'J'K'L'M'N'O'P'S