آ) جدول کارنو برای تابع به صورت زیر خواهد بود:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
| 1 | 1 | 0 | 0 |  |
| 0 | 1 | 1 | 0 |  |

و در نتیجه خروجی آن به صورت زیر خلاصه می‌شود:

جدول کارنو برای تابع به صورت زیر خواهد بود:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
| 0 | 0 | 1 | 1 |  |
| 1 | 0 | 0 | 1 |  |

و در نتیجه خروجی آن به صورت زیر خلاصه می‌شود:

ب) implicant ها در قسمت آ) تعیین شده است، همانگونه که از جدول و عبارت بدست آمده مشخص است، تعداد Non-redundant ان‌ها برای هر یک از توابع عدد ۲ می‌باشد.

ج) براساس DNF توابع مجموعه implicant ها به صورت زیر خواهد‌ بود:

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  | T | T |  |
| T | F |  |  |
| F | F |  |  |
|  | T | F |  |

نیازمندی‌های آزمون شامل تمام implicantهایی است که مقدار آن‌ها برابر True است.

**MUTP:**

Test Data:

110 - UTP for term ab

111 - UTP for term ab

001 - UTP for term !bc

101 - UTP for term !bc

MUTP is feasible for all terms.

Number of tests: 4

Number and types of mutants generated:

Number of False mutants generated: 0

Number of True mutants generated: 0

Number of TOF mutants generated: 0

Number of TIF mutants generated: 0

Number of TRF mutants generated: 4

Total Number of Non-Equivalent Mutants Generated: 4

Mutants:

a & b & c | !b & c

a & b & !c | !b & c

a & b | !b & c & a

a & b | !b & c & !a

**CUTPNFP:**

Test Data:

110 - UTP for term ab

010 - NFP for literal a in term ab

100 - NFP for literal b in term ab

001 - UTP for term !bc

011 - NFP for literal b in term !bc

000 - NFP for literal c in term !bc

CUTPNFP is feasible for all literals.

Number of tests: 6

Number and types of mutants generated:

Number of False mutants generated: 0

Number of True mutants generated: 0

Number of TOF mutants generated: 0

Number of TIF mutants generated: 4

Number of TRF mutants generated: 2

Total Number of Non-Equivalent Mutants Generated: 6

Mutants:

a & b & c | !b & c

a & b | !b & c | !a & b & !c

a & b | !b & c | a & !b & !c

a & b | !b & c & a

a & b | !b & c | !a & b & c

a & b | !b & c | !a & !b & !c

**MNFP:**

Test Data:

010 - NFP for literal a in term ab

011 - NFP for literal a in term ab, literal b in term !bc

100 - NFP for literal b in term ab, literal c in term !bc

000 - NFP for literal c in term !bc

MNFP is not feasible for all literals.

Number of tests: 4

Number and types of mutants generated:

Number of False mutants generated: 0

Number of True mutants generated: 0

Number of TOF mutants generated: 0

Number of TIF mutants generated: 4

Number of TRF mutants generated: 0

Total Number of Non-Equivalent Mutants Generated: 4

Mutants:

a & b | !b & c | !a & b & !c

a & b | !b & c | !a & b & c

a & b | !b & c | a & !b & !c

a & b | !b & c | !a & !b & !c