SR

TRUTH TABLE

S R Q(n+1)

0 0 Q(n) / Memory / No change

0 1 0

1 0 1

1 1 Indeterminate

CHARACTERISTIC TABLE (S-R) EXCITATION TABLE (S-R)

S R Q(n) Q(n+1) Q(n) Q(n+1) S R

0 0 0 0 0 0 0 X

0 0 1 1 0 1 1 0

0 1 0 0 1 0 0 1

0 1 1 0 1 1 X 0

1 0 0 1

1 0 1 1

1 1 0 X

1 1 1 X

Q(n+1) = S + R’Q(n)

TRUTH TABLE J-K CHARACTERISTIC TABLE EXCITATION TABLE

J K Q(n+1) J K Q(n) Q(n+1) Q(n) Q(n+1) J K

0 0 Q(n) 0 0 0 0 0 0 0 X

0 1 0 0 0 1 1 0 1 1 X

1 0 1 0 1 0 0 1 0 X 1

1 1 Q’(n) 0 1 1 0 1 1 X 0

1 0 0 1

1 0 1 1

1 1 0 1

1 1 1 0

Q(n+1) = JQ’(n) + K’Q(n)

T Q(n) Q(n+1)

0 0 0

0 1 1

1 0 1

1 1 0

2. (a)

P N Q(n+1) P N Q(n) Q(n+1)

0 0 0 0 0 0 0

0 1 No change 0 0 1 0

1 0 Q’ 0 1 0 0

1 1 1 0 1 1 1

(b) 1 0 0 1

Q(n) Q(n+1) P N 1 0 1 0

0 0 0 X 1 1 0 1

0 1 1 X 1 1 1 1

1 0 X 0 (d) Q(t+1) = NQ(t) + PQ’(t)

1 1 X 1

Encoder Truth Table

Y7 Y6 Y5 Y4 Y3 Y2 Y1 Y0 A B C

0 0 0 0 0 0 0 1 0 0 0

0 0 0 0 0 0 1 0 0 0 1

0 0 0 0 0 1 0 0 0 1 0

0 0 0 0 1 0 0 0 0 1 1

0 0 0 1 0 0 0 0 1 0 0

0 0 1 0 0 0 0 0 1 0 1

0 1 0 0 0 0 0 0 1 1 0

1 0 0 0 0 0 0 0 1 1 1

So, from the truth table you can write

A = Y4 + Y5 + Y6 + Y7

B = Y2 + Y3 + Y6 + Y7

C = Y1 + Y3 + Y5 + Y7

**From T to D**

XOR

D T Q(n)

Find Expression of T (the existing flipflop) in terms of D (the target flipflop), and the previous output Q(n)

D Q(n) Q(n+1) T

0 0 0 0

0 1 0 1

1 0 1 1

1 1 1 0 T = D ^ Q(n)

S

JK to SR conversion

I have to find expression of J in terms of S, R, and Q(n)

I have to find expression of K in terms of S, R, and Q(n)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S  RQ | 00 | 01 | 11 | 10 |
| 0 | 0 | X | X | 0 |
| 1 | 1 | X | X | X |

S R Q(n) Q(n+1) J K

0 0 0 0 0 X

0 0 1 1 X 0

0 1 0 0 0 X

0 1 1 0 X 1

J = S

1 0 0 1 1 X

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| RQ  S | 00 | 01 | 11 | 10 |
|  | X | 0 | 1 | X |
|  | X | 0 | X | X |

1 0 1 1 X 0

1 1 0 X X X

1 1 1 X X X

K = R

Q

J

S

Q’

K

R

SR to JK conversion

I have to find expression of S in terms of J, K, and Q(n)

I have to find expression of R in terms of J, K, and Q(n)

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

J K Q(n) Q(n+1) S R S

KQ

0 0 0 0 0 X

J

0 0 1 1 X 0

0 1 0 0 0 X

0 1 1 0 0 1 S = JQ’

1 0 0 1 1 0 R

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

1 0 1 1 X 0

1 1 0 1 1 0

1 1 1 0 0 1 R = KQ

KQ

JQ’

Q’

Q

J

K

R

S