***Sequential Circuit***

1.    Design a 3-bit sequential circuit using D flip flop that goes through state transition from 0 -> 6 -> 2 -> 3 -> 5 -> 0.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| X(t) | Y(t) | Z(t) |  | X(t+1) | Y(t+1) | Z(t+1) |  |  |  |
| 0 | 0 | 0 |  | 1 | 1 | 0 |  |  |  |
| 0 | 0 | 1 |  | X | X | X |  |  |  |
| 0 | 1 | 0 |  | 0 | 1 | 1 |  |  |  |
| 0 | 1 | 1 |  | 1 | 0 | 1 |  |  |  |
| 1 | 0 | 0 |  | X | X | X |  |  |  |
| 1 | 0 | 1 |  | 0 | 0 | 0 |  |  |  |
| 1 | 1 | 0 |  | 0 | 1 | 0 |  |  |  |
| 1 | 1 | 1 |  | X | X | X |  |  |  |
|  |  |  |  |  |  |  |  |  |  |

X(t+1) = X’(t)Y’(t)Z’(t) + X’(t)Y(t)Z(t)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| X | YZ |  |  |  |
|  | 00 | 01 | 11 | 10 |
| 0 | 1 | X | 1 | 0 |
| 1 | X | 0 | X | X |

Y(t+1) = Z’(t)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| X | YZ |  |  |  |
|  | 00 | 01 | 11 | 10 |
| 0 | 1 | X | 0 | 1 |
| 1 | X | 0 | X | 1 |

Z(t+1) = X’(t)Y(t)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| X | YZ |  |  |  |
|  | 00 | 01 | 11 | 10 |
| 0 | 0 | X | 1 | 1 |
| 1 | X | 0 | X | 0 |