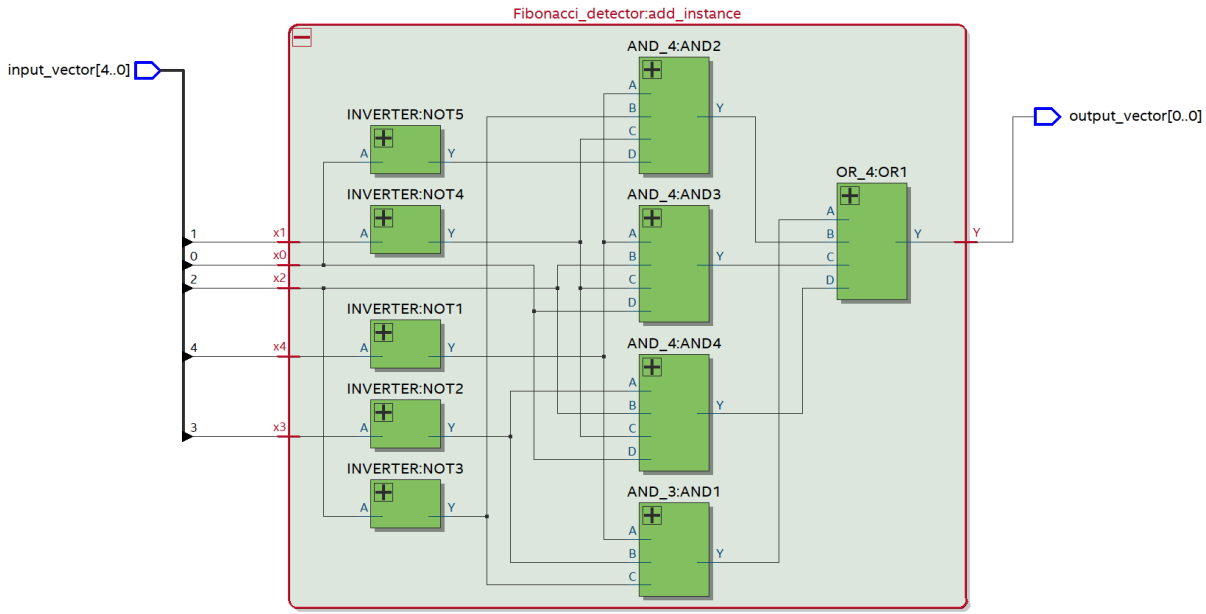
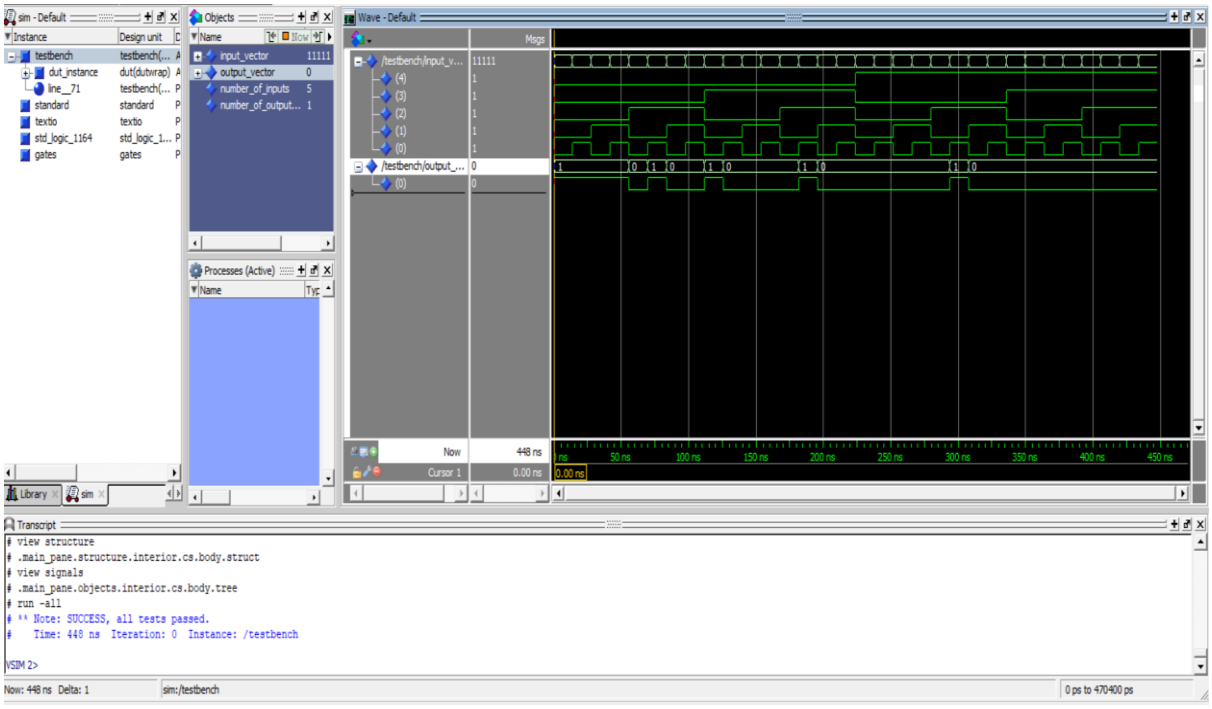
# EE214 Digital Circuits Laboratory

## EXP3 – Fibonacci Detector

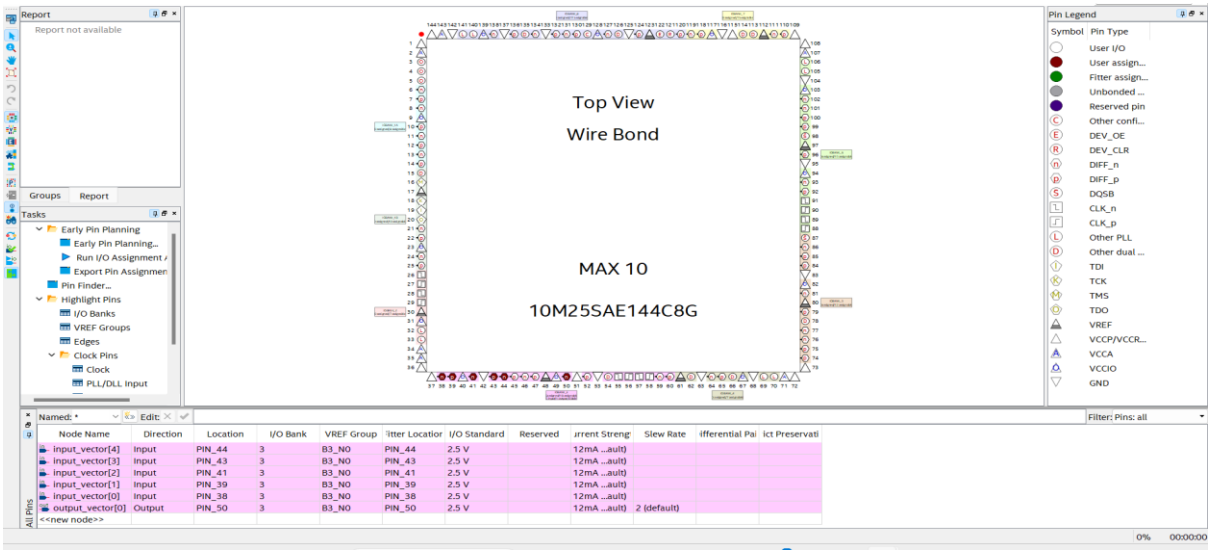
### RTL Viewer:



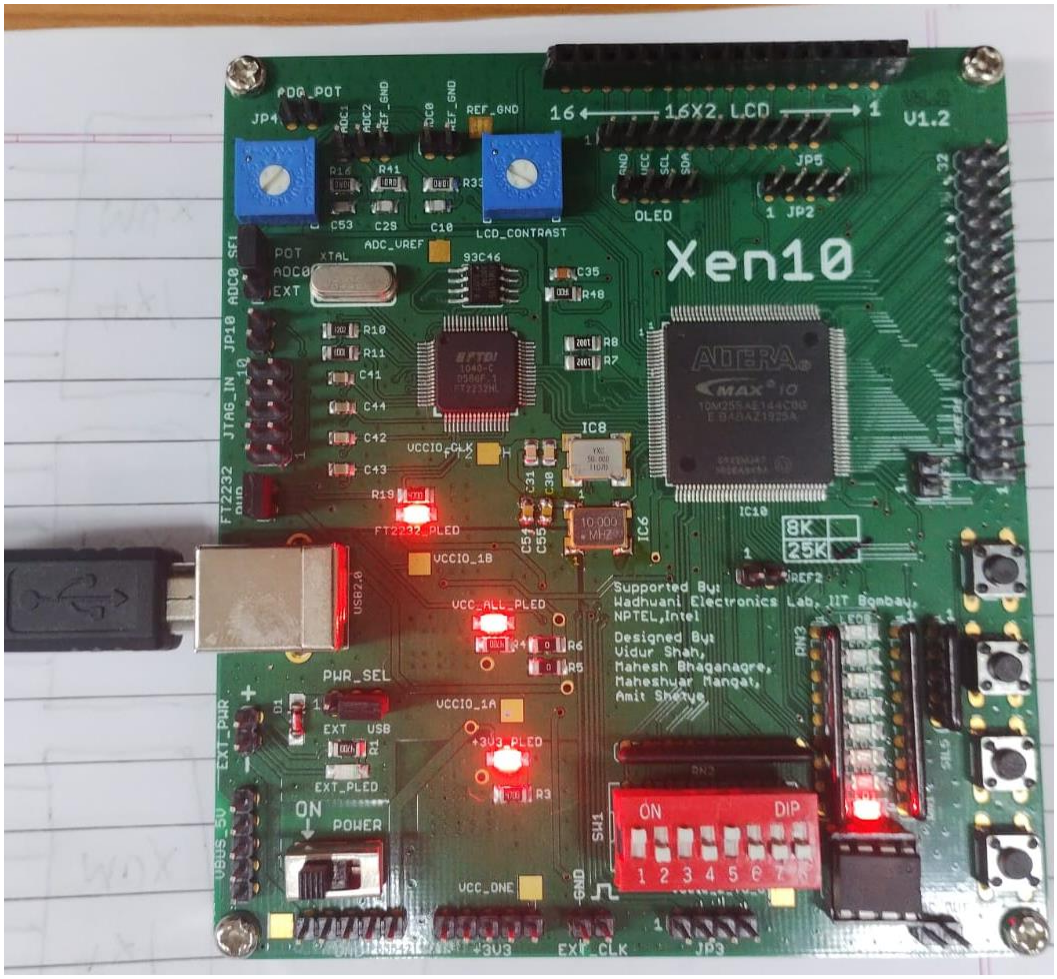

### RTL Simulation:



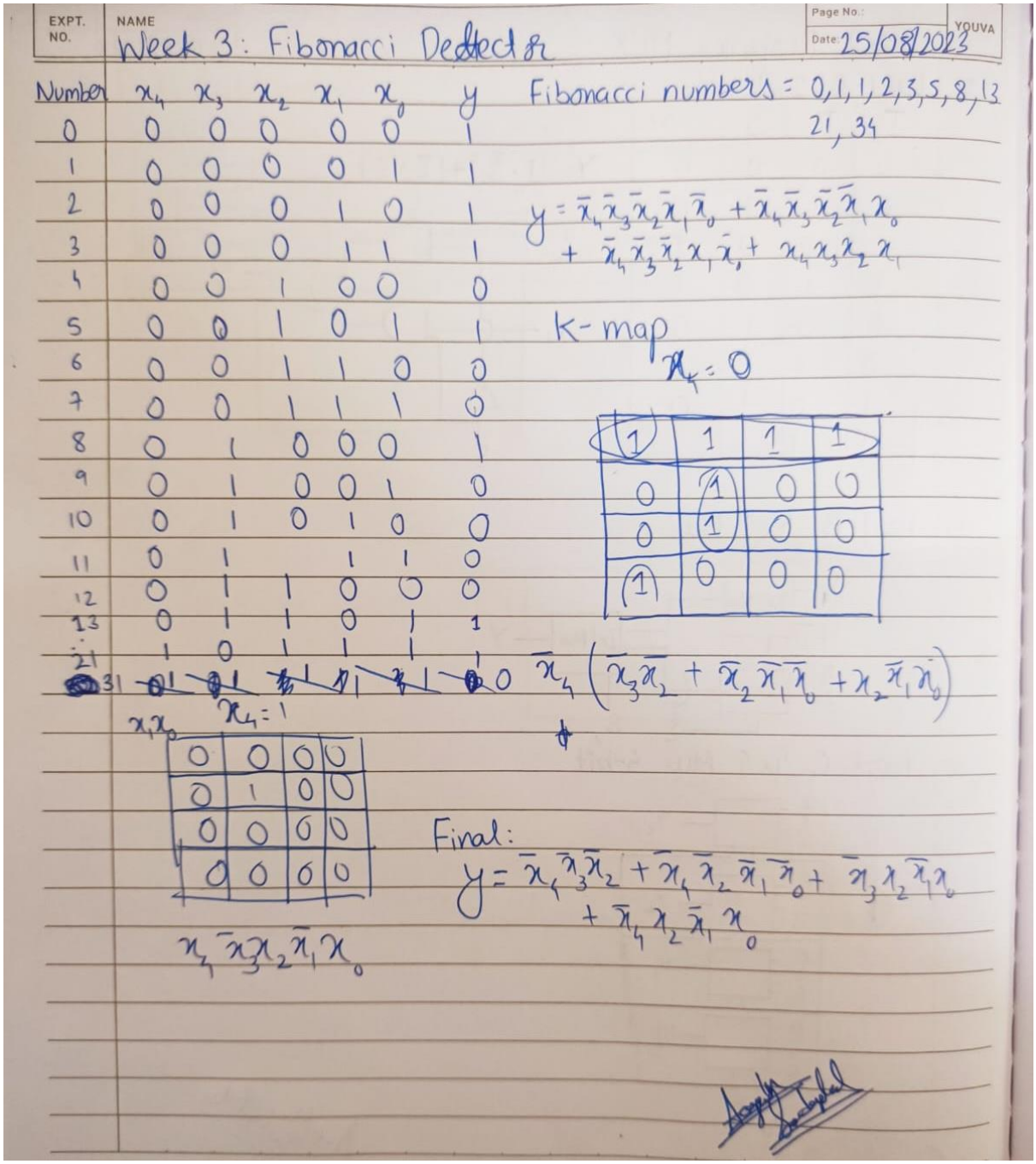
## Pin Planner:




## Manual verification using Xen-10 board:



**Lab journal:**



EXPT. NO.

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YOUVA

| Number | $x_4$ | $x_3$ | $x_2$ | $x_1$ | $x_0$ | $y$ |
|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 1 | 0 | 0 | 0 | 0 | 1 | 1 |
| 2 | 0 | 0 | 0 | 1 | 0 | 1 |
| 3 | 0 | 0 | 0 | 1 | 1 | 1 |
| 4 | 0 | 0 | 1 | 0 | 0 | 0 |
| 5 | 0 | 0 | 1 | 0 | 1 | 1 |
| 6 | 0 | 0 | 1 | 1 | 0 | 0 |
| 7 | 0 | 0 | 1 | 1 | 1 | 0 |
| 8 | 0 | 1 | 0 | 0 | 0 | 1 |
| 9 | 0 | 1 | 0 | 0 | 1 | 0 |
| 10 | 0 | 1 | 0 | 1 | 0 | 0 |
| 11 | 0 | 1 | | 1 | 1 | 0 |
| 12 | 0 | 1 | 1 | 0 | 0 | 0 |
| 13 | 0 | 1 | 1 | 0 | 1 | 1 |
| 21 | 1 | 0 | 1 | 1 | 1 | 1 |
| 31 | 1 | 1 | 1 | 1 | 1 | 0 |

Fibonacci numbers = 0, 1, 1, 2, 3, 5, 8, 13, 21, 34

$$y = \bar{x}_4\bar{x}_3\bar{x}_2\bar{x}_1\bar{x}_0 + \bar{x}_4\bar{x}_3\bar{x}_2\bar{x}_1x_0 + \bar{x}_4\bar{x}_3\bar{x}_2x_1\bar{x}_0 + x_4x_3x_2x_1$$

K-map

$x_4 = 0$

| $x_3x_2$ \ $x_1x_0$ | 00 | 01 | 11 | 10 |
|---|---|---|---|---|
| 00 | 1 | 1 | 1 | 1 |
| 01 | 0 | 1 | 0 | 0 |
| 11 | 0 | 1 | 0 | 0 |
| 10 | 1 | 0 | 0 | 0 |

$x_4 = 1$

| $x_3x_2$ \ $x_1x_0$ | 00 | 01 | 11 | 10 |
|---|---|---|---|---|
| 00 | 0 | 0 | 0 | 0 |
| 01 | 0 | 1 | 0 | 0 |
| 11 | 0 | 0 | 0 | 0 |
| 10 | 0 | 0 | 0 | 0 |

$$\bar{x}_4\left(\bar{x}_3\bar{x}_2 + \bar{x}_2\bar{x}_1\bar{x}_0 + x_2\bar{x}_1\bar{x}_0\right) + x_4\bar{x}_3\bar{x}_2\bar{x}_1x_0$$

Final:

$$y = \bar{x}_4\bar{x}_3\bar{x}_2 + \bar{x}_4\bar{x}_2\bar{x}_1\bar{x}_0 + \bar{x}_3x_2\bar{x}_1x_0 + \bar{x}_4x_2\bar{x}_1x_0$$