For combinations cells (depending on number of inputs – example, inverter has only A input), the following characterizations have to be performed and filled. Remove all unwanted rows.

1. **Input pin capacitances:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Input Pins** | **Rise Cap (fF)** | **Fall Cap (fF)** | **Average Cap (fF)** |
| A | 2.317 | 2.281 | 2.299 |

1. **Transition Time Table:** (please strictly consider 20% and 80% of VDD for transition time)

**(i) Output Rise Transitions** **(in ps)** [Input slew vs output capacitance].

**Related pin A**: (i.e., other input pins are held constant)

|  |  |  |  |
| --- | --- | --- | --- |
|  | **10 ps** | **100 ps** | **1000 ps** |
| **0.5 fF** | 14.5ps | 14.7ps | 30ps |
| **10 fF** | 67.4ps | 67.3ps | 73.7ps |
| **100 fF** | 592.2ps | 592.2ps | 592.8ps |

**(ii) Output Fall Transitions** **(in ps)** [Input slew vs output capacitance].

**Related pin A**: (i.e., other input pins are held constant)

|  |  |  |  |
| --- | --- | --- | --- |
|  | **10 ps** | **100 ps** | **1000 ps** |
| **0.5 fF** | 14.5ps | 14.7ps | 27.8ps |
| **10 fF** | 72.7ps | 72.8ps | 79.3ps |
| **100 fF** | 641.3ps | 641.2ps | 642.2ps |

1. **Propagation delay time tables**: (unlike textbook definitions that we used for our assignments, here we will use 50% of input to 50% of output to simulate propagation delay – by keeping other inputs fixed).

**(i) Cell Rise Delay (in ns)** [Input slew vs output capacitance].

**Related pin A**: (i.e., other input pins are held constant)

|  |  |  |  |
| --- | --- | --- | --- |
|  | **10 ps** | **100 ps** | **1000 ps** |
| **0.5 fF** | 47.1ps | 65.6ps | 145.1 |
| **10 fF** | 87.6ps | 106.1ps | 196.8 |
| **100 fF** | 446.0ps | 464.6ps | 556.4 |

**(ii) Cell Fall Delay (in ns)** [Input slew vs output capacitance].

**Related pin A**: (i.e., other input pins are held constant)

|  |  |  |  |
| --- | --- | --- | --- |
|  | **10 ps** | **100 ps** | **1000 ps** |
| **0.5 fF** | 46.1ps | 67ps | 157.6 |
| **10 fF** | 96.0ps | 117.6ps | 217.3 |
| **100 fF** | 532ps | 554.1ps | 656.3 |

1. **Static Power (cover all possible input combinations based on number of inputs).**

|  |  |
| --- | --- |
| **Condition (A)** | **Power (nW)** |
| 0 | 0.11634 |
| 1 | 0.11634 |

1. **Dynamic Power Table:**

**(i) Rise Power (in uW)** [Input slew vs output capacitance].

**Related pin A**: (i.e., other input pins are held constant)

|  |  |  |  |
| --- | --- | --- | --- |
|  | **10 ps** | **100 ps** | **1000 ps** |
| **0.5 fF** | 88.39 | 24.05 | 8.37 |
| **10 fF** | 162.00 | 96.08 | 26.19 |
| **100 fF** | 170.29 | 173.12 | 110.366 |

**(ii) Fall Power (in uW)** [Input slew vs output capacitance].

**Related pin A**: (i.e., other input pins are held constant)

|  |  |  |  |
| --- | --- | --- | --- |
|  | **10 ps** | **100 ps** | **1000 ps** |
| **0.5 fF** | 94.92 | 66.04 | 11.73 |
| **10 fF** | 96.00 | 67.36 | 12.02 |
| **100 fF** | 120.96 | 68.81 | 11.63 |