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 | 4.23 | 3.64 | 3.935 |

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

**(i) Output Rise Transitions** **(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** | 0.02319 | 0.02284 | 0.0395 |
| **10 fF** | 0.10607 | 0.1095 | 0.1116 |
| **100 fF** | 0.9377 | 0.9401 | 0.938 |

**(ii) Output Fall Transitions** **(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** | 0.02177 | 0.020935 | 0.0373 |
| **10 fF** | 0.097116 | 0.0985 | 0.0987 |
| **100 fF** | 0.820 | 0.845 | 0.878 |

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** | 0.05465 | 0.07927 | 0.15 |
| **10 fF** | 0.11555 | 0.1369 | 0.2341 |
| **100 fF** | 0.7158 | 0.6737 | 0.851 |

**(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** | 0.06046 | 0.08536 | 0.18 |
| **10 fF** | 0.11333 | 0.1368 | 0.2978 |
| **100 fF** | 0.5895 | 0.5474 | 0.745 |

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

|  |  |
| --- | --- |
| **Condition (A)** | **Power (nW)** |
| 0 | 1.08902 |
| 1 | 1.06751 |

1. **Dynamic Power Table:**

**(i) Rise Power (in nW)** [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** | 16741 | 3500 | 1190 |
| **10 fF** | 1138.79 | 15279.3 | 24410 |
| **100 fF** | 1031.4 | 11297.2 | 13101 |

**(ii) Fall Power (in nW)** [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** | 31360 | 16530 | 9180 |
| **10 fF** | 0.000003674 | 0.0000006488 | 0.00000883524 |
| **100 fF** | 0.0000024186 | 0.0000024186335 | 0.0000010084 |