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 (pF)** | **Fall Cap (pF)** | **Average Cap (pF)** |
| A | 0.00221 | 0.00276 | 0.002485 |

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** | 0.0178 | 0.0177 | 0.0381 |
| **10 fF** | 0.0500 | 0.0499 | 0.0622 |
| **100 fF** | 0.3983 | 0.3954 | 0.3960 |

**(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** | 0.0176 | 0.0167 | 0.0303 |
| **10 fF** | 0.0537 | 0.0539 | 0.0646 |
| **100 fF** | 0.4310 | 0.43103 | 0.4322 |

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** | 0.05516 | 0.0742 | 0.167 |
| **10 fF** | 0.0846 | 0.1035 | 0.2100 |
| **100 fF** | 0.3227 | 0.3417 | 0.4508 |

**(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** | 0.05305 | 0.0754 | 0.182 |
| **10 fF** | 0.08877 | 0.1109 | 0.2286 |
| **100 fF** | 0.37932 | 0.4107 | 0.5236 |

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

|  |  |
| --- | --- |
| **Condition (ABC)** | **Power (nW)** |
| 0 | 0.116 |
| 1 | 0.542 |

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** | 1575 | 1575 | 2124 |
| **10 fF** | 4590 | 8100 | 8280 |
| **100 fF** | 32850 | 32850 | 38016 |

**(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** | 3375 | 3915 | 4825 |
| **10 fF** | 7110 | 4860 | 4140 |
| **100 fF** | 3564 | 2610 | 2160 |