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 |  |  |  |
| B |  |  |  |
| C |  |  |  |

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** |  |  |  |
| **10 fF** |  |  |  |
| **100 fF** |  |  |  |

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

|  |  |  |  |
| --- | --- | --- | --- |
|  | **10 ps** | **100 ps** | **1000 ps** |
| **0.5 fF** |  |  |  |
| **10 fF** |  |  |  |
| **100 fF** |  |  |  |

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

|  |  |  |  |
| --- | --- | --- | --- |
|  | **10 ps** | **100 ps** | **1000 ps** |
| **0.5 fF** |  |  |  |
| **10 fF** |  |  |  |
| **100 fF** |  |  |  |

**(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** |  |  |  |
| **10 fF** |  |  |  |
| **100 fF** |  |  |  |

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

|  |  |  |  |
| --- | --- | --- | --- |
|  | **10 ps** | **100 ps** | **1000 ps** |
| **0.5 fF** |  |  |  |
| **10 fF** |  |  |  |
| **100 fF** |  |  |  |

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

|  |  |  |  |
| --- | --- | --- | --- |
|  | **10 ps** | **100 ps** | **1000 ps** |
| **0.5 fF** |  |  |  |
| **10 fF** |  |  |  |
| **100 fF** |  |  |  |

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** |  |  |  |
| **10 fF** |  |  |  |
| **100 fF** |  |  |  |

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

|  |  |  |  |
| --- | --- | --- | --- |
|  | **10 ps** | **100 ps** | **1000 ps** |
| **0.5 fF** |  |  |  |
| **10 fF** |  |  |  |
| **100 fF** |  |  |  |

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

|  |  |  |  |
| --- | --- | --- | --- |
|  | **10 ps** | **100 ps** | **1000 ps** |
| **0.5 fF** |  |  |  |
| **10 fF** |  |  |  |
| **100 fF** |  |  |  |

**(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** |  |  |  |
| **10 fF** |  |  |  |
| **100 fF** |  |  |  |

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

|  |  |  |  |
| --- | --- | --- | --- |
|  | **10 ps** | **100 ps** | **1000 ps** |
| **0.5 fF** |  |  |  |
| **10 fF** |  |  |  |
| **100 fF** |  |  |  |

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

|  |  |  |  |
| --- | --- | --- | --- |
|  | **10 ps** | **100 ps** | **1000 ps** |
| **0.5 fF** |  |  |  |
| **10 fF** |  |  |  |
|  |  |  |  |

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

|  |  |
| --- | --- |
| **Condition (ABC)** | **Power (nW)** |
| 000 |  |
| 001 |  |
| 010 |  |
|  |  |

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** |  |  |  |
| **10 fF** |  |  |  |
| **100 fF** |  |  |  |

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

|  |  |  |  |
| --- | --- | --- | --- |
|  | **10 ps** | **100 ps** | **1000 ps** |
| **0.5 fF** |  |  |  |
| **10 fF** |  |  |  |
| **100 fF** |  |  |  |

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

|  |  |  |  |
| --- | --- | --- | --- |
|  | **10 ps** | **100 ps** | **1000 ps** |
| **0.5 fF** |  |  |  |
| **10 fF** |  |  |  |
| **100 fF** |  |  |  |

**(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** |  |  |  |
| **10 fF** |  |  |  |
| **100 fF** |  |  |  |

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

|  |  |  |  |
| --- | --- | --- | --- |
|  | **10 ps** | **100 ps** | **1000 ps** |
| **0.5 fF** |  |  |  |
| **10 fF** |  |  |  |
| **100 fF** |  |  |  |

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

|  |  |  |  |
| --- | --- | --- | --- |
|  | **10 ps** | **100 ps** | **1000 ps** |
| **0.5 fF** |  |  |  |
| **10 fF** |  |  |  |
| **100 fF** |  |  |  |