* **Team no. : 16**

**NOR3B chracterstics**

1. **Input pin capacitances:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Input Pins** | **Rise Cap (pF)** | **Fall Cap (pF)** | **Average Cap (pF)** |
| A | 1.19e-3 | 28.54e-3 | 14.87e-3 |
| B | 3.48e-3 | 62.18e-3 | 32.83e-3 |
| C | 3.23e-3 | 58.10e-6 | 30.65e-3 |

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** | 0.0190 | 0.0191 | 0.0342 |
| **10 fF** | 0.0711 | 0.0711 | 0.0792 |
| **100 fF** | 0.5987 | 0.5987 | 0.5998 |

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

|  |  |  |  |
| --- | --- | --- | --- |
|  | **10 ps** | **100 ps** | **1000 ps** |
| **0.5 fF** | 0.0193 | 0.0193 | 0.0203 |
| **10 fF** | 0.0712 | 0.0712 | 0.0717 |
| **100 fF** | 0.5987 | 0.5987 | 0.5987 |

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

|  |  |  |  |
| --- | --- | --- | --- |
|  | **10 ps** | **100 ps** | **1000 ps** |
| **0.5 fF** | 0.0193 | 0.0193 | 0.0200 |
| **10 fF** | 0.0712 | 0.0712 | 0.0715 |
| **100 fF** | 0.5987 | 0.5987 | 0.5987 |

**(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** | 0.0185 | 0.0186 | 0.0332 |
| **10 fF** | 0.0755 | 0.0755 | 0.0855 |
| **100 fF** | 0.6421 | 0.6421 | 0.6429 |

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

|  |  |  |  |
| --- | --- | --- | --- |
|  | **10 ps** | **100 ps** | **1000 ps** |
| **0.5 fF** | 0.0192 | 0.0192 | 0.0194 |
| **10 fF** | 0.0760 | 0.0760 | 0.0761 |
| **100 fF** | 0.6423 | 0.6423 | 0.6423 |

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

|  |  |  |  |
| --- | --- | --- | --- |
|  | **10 ps** | **100 ps** | **1000 ps** |
| **0.5 fF** | 0.0191 | 0.0191 | 0.0195 |
| **10 fF** | 0.0759 | 0.0759 | 0.0761 |
| **100 fF** | 0.6423 | 0.6423 | 0.6424 |

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** | 0.0637 | 0.0812 | 0.1702 |
| **10 fF** | 0.1092 | 0.1266 | 0.2271 |
| **100 fF** | 0.4717 | 0.4893 | 0.5925 |

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

|  |  |  |  |
| --- | --- | --- | --- |
|  | **10 ps** | **100 ps** | **1000 ps** |
| **0.5 fF** | 0.1143 | 0.1345 | 0.2194 |
| **10 fF** | 0.1600 | 0.1802 | 0.2658 |
| **100 fF** | 0.5226 | 0.5428 | 0.6286 |

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

|  |  |  |  |
| --- | --- | --- | --- |
|  | **10 ps** | **100 ps** | **1000 ps** |
| **0.5 fF** | 0.1053 | 0.1226 | 0.1913 |
| **10 fF** | 0.1509 | 0.1682 | 0.2374 |
| **100 fF** | 0.5136 | 0.5308 | 0.6003 |

**(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** | 0.0687 | 0.0894 | 0.2133 |
| **10 fF** | 0.1226 | 0.1431 | 0.2792 |
| **100 fF** | 0.5590 | 0.5801 | 0.7197 |

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

|  |  |  |  |
| --- | --- | --- | --- |
|  | **10 ps** | **100 ps** | **1000 ps** |
| **0.5 fF** | 0.1147 | 0.1645 | 0.3039 |
| **10 fF** | 0.2013 | 0.2188 | 0.3581 |
| **100 fF** | 0.6388 | 0.6562 | 0.7957 |

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

|  |  |  |  |
| --- | --- | --- | --- |
|  | **10 ps** | **100 ps** | **1000 ps** |
| **0.5 fF** | 0.1241 | 0.1407 | 0.2484 |
| **10 fF** | 0.1783 | 0.1949 | 0.3027 |
|  | 0.6157 | 0.6323 | 0.7404 |

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

|  |  |
| --- | --- |
| **Condition (ABC)** | **Power (nW)** |
| 000 | 0.118 |
| 001 | 0.901 |
| 010 | 0.456 |
| 011 | 0.124 |
| 100 | 1.266 |
| 101 | 0.906 |
| 110 | 0.461 |
| 111 | 0.129 |

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** | 138913 | 15850 | 1890 |
| **10 fF** | 136017 | 15660 | 1872 |
| **100 fF** | 135021 | 15300 | 1818 |

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

|  |  |  |  |
| --- | --- | --- | --- |
|  | **10 ps** | **100 ps** | **1000 ps** |
| **0.5 fF** | 542682 | 155250 | 114387 |
| **10 fF** | 544030 | 176220 | 190746 |
| **100 fF** | 545373 | 211654 | 224128 |

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

|  |  |  |  |
| --- | --- | --- | --- |
|  | **10 ps** | **100 ps** | **1000 ps** |
| **0.5 fF** | 397500 | 120767 | 108725 |
| **10 fF** | 398043 | 177313 | 187154 |
| **100 fF** | 401250 | 215000 | 223839 |

**(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** | 189391 | 71730 | 42876 |
| **10 fF** | 194478 | 63024 | 23103 |
| **100 fF** | 195019 | 70020 | 17568 |

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

|  |  |  |  |
| --- | --- | --- | --- |
|  | **10 ps** | **100 ps** | **1000 ps** |
| **0.5 fF** | 456716 | 51498 | 5661 |
| **10 fF** | 454030 | 50508 | 5580 |
| **100 fF** | 452682 | 50400 | 5490 |

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

|  |  |  |  |
| --- | --- | --- | --- |
|  | **10 ps** | **100 ps** | **1000 ps** |
| **0.5 fF** | 365625 | 50985 | 5661 |
| **10 fF** | 362812 | 50499 | 5535 |
| **100 fF** | 360938 | 50328 | 5508 |