

# IE1204 Digital Design Answer Form 2021-05-17

| Full Name    |  | Personal Number  | Program                     |       |       |       |       |       |       |       |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |
|--------------|--|--|-----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----|--|--|--|--|--|--|--|--|--|--|---|--|--|--|--|--|--|--|--|--|--|--|
|              |  |  |                             |       |       |       |       |       |       |       |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |
| #            | Answer with  | Answer   | Points                      |       |       |       |       |       |       |       |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |
| 1            | Decimal number   |  |                             |       |       |       |       |       |       |       |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |
| 2            | 8 bit two's complement binary number   | <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> </tr> </table> |                             |       |       |       |       |       |       |       |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |
|              |  |  |                             |       |       |       |       |       |       |       |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |
| 3            | 8 bit two's complement binary number   | <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> </tr> </table> |                             |       |       |       |       |       |       |       |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |
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| 4            | Boolean expression, Y =  |  |                             |       |       |       |       |       |       |       |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |
| 5            | Boolean expression, Y =  |  |                             |       |       |       |       |       |       |       |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |
| 6            | Boolean expression, Y =  |  |                             |       |       |       |       |       |       |       |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |
| 7            | MUX connections  |  |                             |       |       |       |       |       |       |       |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |
|              | Row CD = 00  |  |                             |       |       |       |       |       |       |       |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |
|              | Row CD = 01  |  |                             |       |       |       |       |       |       |       |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |
|              | Row CD = 10  |  |                             |       |       |       |       |       |       |       |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |
|              | Row CD = 11  |  |                             |       |       |       |       |       |       |       |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |
| 8            | Timing diagram   |  |                             |       |       |       |       |       |       |       |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |
|              | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;"></td> <td style="width: 10%;">0 ms</td> <td style="width: 10%;">5 ms</td> <td style="width: 10%;">10 ms</td> <td style="width: 10%;">15 ms</td> <td style="width: 10%;">20 ms</td> <td style="width: 10%;">25 ms</td> <td style="width: 10%;">30 ms</td> <td style="width: 10%;">35 ms</td> <td style="width: 10%;">40 ms</td> <td style="width: 10%;">45 ms</td> </tr> <tr> <td>CLK</td> <td colspan="10"></td> </tr> <tr> <td>Q</td> <td colspan="10"></td> </tr> </table> |  | 0 ms                        | 5 ms  | 10 ms | 15 ms | 20 ms | 25 ms | 30 ms | 35 ms | 40 ms | 45 ms | CLK |  |  |  |  |  |  |  |  |  |  | Q |  |  |  |  |  |  |  |  |  |  |  |
|              | 0 ms   | 5 ms   | 10 ms                       | 15 ms | 20 ms | 25 ms | 30 ms | 35 ms | 40 ms | 45 ms |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |
| CLK          |  |  |                             |       |       |       |       |       |       |       |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |
| Q            |  |  |                             |       |       |       |       |       |       |       |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |
| 9            | Timing diagram   |  |                             |       |       |       |       |       |       |       |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |
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|              | 0 ms   | 5 ms   | 10 ms                       | 15 ms | 20 ms | 25 ms | 30 ms | 35 ms | 40 ms | 45 ms |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |
| CLK          |  |  |                             |       |       |       |       |       |       |       |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |
| Q            |  |  |                             |       |       |       |       |       |       |       |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |
| 10           | Setup condition  | <input type="checkbox"/> Yes   | <input type="checkbox"/> No |       |       |       |       |       |       |       |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |
|              | Hold condition   | <input type="checkbox"/> Yes   | <input type="checkbox"/> No |       |       |       |       |       |       |       |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |
| 11           | Boolean expression (Hazard fix only)   |  |                             |       |       |       |       |       |       |       |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |
| 12           | 16 bit two's complement binary number, MSB   | <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> </tr> </table> |                             |       |       |       |       |       |       |       |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |
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|              | LSB  | <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> </tr> </table> |                             |       |       |       |       |       |       |       |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |
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| 13           | 8 bit two's complement binary number   | <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> </tr> </table> |                             |       |       |       |       |       |       |       |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |
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| 14           | Number interval  |  |                             |       |       |       |       |       |       |       |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |
| 15           | 5 result bits (S4 S3 S2 S1 S0)   | <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> </tr> </table>  |                             |       |       |       |       |       |       |       |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |
|              |  |  |                             |       |       |       |       |       |       |       |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |
| 16           | 4 flag bits (V C N Z)  | <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> </tr> </table>   |                             |       |       |       |       |       |       |       |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |
|              |  |  |                             |       |       |       |       |       |       |       |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |
| TOTAL POINTS |  | Examiner sign  |                             |       |       |       |       |       |       |       |       |       |     |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |