

Circuit Excitation Table

| Present States/Inputs |   |   | Next State |  |  | Flip-flop Inputs and Circuit Outputs |  |  |  |  |  |  |
|-----------------------|---|---|------------|--|--|--------------------------------------|--|--|--|--|--|--|
|                       |   |   |            |  |  |                                      |  |  |  |  |  |  |
| 0                     | 0 | 0 |            |  |  |                                      |  |  |  |  |  |  |
| 0                     | 0 | 1 |            |  |  |                                      |  |  |  |  |  |  |
| 0                     | 1 | 0 |            |  |  |                                      |  |  |  |  |  |  |
| 0                     | 1 | 1 |            |  |  |                                      |  |  |  |  |  |  |
| 1                     | 0 | 0 |            |  |  |                                      |  |  |  |  |  |  |
| 1                     | 0 | 1 |            |  |  |                                      |  |  |  |  |  |  |
| 1                     | 1 | 0 |            |  |  |                                      |  |  |  |  |  |  |
| 1                     | 1 | 1 |            |  |  |                                      |  |  |  |  |  |  |

Flip-flop Excitation Tables

| Q(t) | Q(t+1) | J | K | S | R | D | T |
|------|--------|---|---|---|---|---|---|
| 0    | 0      | 0 | X | 0 | X | 0 | 0 |
| 0    | 1      | 1 | X | 1 | 0 | 1 | 1 |
| 1    | 0      | X | 1 | 0 | 1 | 0 | 1 |
| 1    | 1      | X | 0 | X | 0 | 1 | 0 |

Flip-flop Input Functions and Circuit Output Functions

|   |    |    |    |    |
|---|----|----|----|----|
|   | 00 | 01 | 11 | 10 |
| 0 |    |    |    |    |
| 1 |    |    |    |    |

|   |    |    |    |    |
|---|----|----|----|----|
|   | 00 | 01 | 11 | 10 |
| 0 |    |    |    |    |
| 1 |    |    |    |    |

|   |    |    |    |    |
|---|----|----|----|----|
|   | 00 | 01 | 11 | 10 |
| 0 |    |    |    |    |
| 1 |    |    |    |    |

|   |    |    |    |    |
|---|----|----|----|----|
|   | 00 | 01 | 11 | 10 |
| 0 |    |    |    |    |
| 1 |    |    |    |    |

|   |    |    |    |    |
|---|----|----|----|----|
|   | 00 | 01 | 11 | 10 |
| 0 |    |    |    |    |
| 1 |    |    |    |    |

|   |    |    |    |    |
|---|----|----|----|----|
|   | 00 | 01 | 11 | 10 |
| 0 |    |    |    |    |
| 1 |    |    |    |    |

|   |    |    |    |    |
|---|----|----|----|----|
|   | 00 | 01 | 11 | 10 |
| 0 |    |    |    |    |
| 1 |    |    |    |    |

|   |    |    |    |    |
|---|----|----|----|----|
|   | 00 | 01 | 11 | 10 |
| 0 |    |    |    |    |
| 1 |    |    |    |    |

Circuit Excitation Table

| Present State/Circuit Inputs |   |   |   | Next State |  |  |  | Flip-flop Inputs and Circuit Outputs |  |  |  |
|------------------------------|---|---|---|------------|--|--|--|--------------------------------------|--|--|--|
| 0                            | 0 | 0 | 0 |            |  |  |  |                                      |  |  |  |
| 0                            | 0 | 0 | 1 |            |  |  |  |                                      |  |  |  |
| 0                            | 0 | 1 | 0 |            |  |  |  |                                      |  |  |  |
| 0                            | 0 | 1 | 1 |            |  |  |  |                                      |  |  |  |
| 0                            | 1 | 0 | 0 |            |  |  |  |                                      |  |  |  |
| 0                            | 1 | 0 | 1 |            |  |  |  |                                      |  |  |  |
| 0                            | 1 | 1 | 0 |            |  |  |  |                                      |  |  |  |
| 0                            | 1 | 1 | 1 |            |  |  |  |                                      |  |  |  |
| 1                            | 0 | 0 | 0 |            |  |  |  |                                      |  |  |  |
| 1                            | 0 | 0 | 1 |            |  |  |  |                                      |  |  |  |
| 1                            | 0 | 1 | 0 |            |  |  |  |                                      |  |  |  |
| 1                            | 0 | 1 | 1 |            |  |  |  |                                      |  |  |  |
| 1                            | 1 | 0 | 0 |            |  |  |  |                                      |  |  |  |
| 1                            | 1 | 0 | 1 |            |  |  |  |                                      |  |  |  |
| 1                            | 1 | 1 | 0 |            |  |  |  |                                      |  |  |  |
| 1                            | 1 | 1 | 1 |            |  |  |  |                                      |  |  |  |

Flip-flop Excitation Tables

| Q(t) | Q(t+1) | J | K | S | R | D | T |
|------|--------|---|---|---|---|---|---|
| 0    | 0      | 0 | X | 0 | X | 0 | 0 |
| 0    | 1      | 1 | X | 1 | 0 | 1 | 1 |
| 1    | 0      | X | 1 | 0 | 1 | 0 | 1 |
| 1    | 1      | X | 0 | X | 0 | 1 | 0 |

Flip-flop Input Functions and Circuit Output Functions

|    |    |    |    |    |
|----|----|----|----|----|
|    | 00 | 01 | 11 | 10 |
| 00 |    |    |    |    |
| 01 |    |    |    |    |
| 11 |    |    |    |    |
| 10 |    |    |    |    |

|    |    |    |    |    |
|----|----|----|----|----|
|    | 00 | 01 | 11 | 10 |
| 00 |    |    |    |    |
| 01 |    |    |    |    |
| 11 |    |    |    |    |
| 10 |    |    |    |    |

|    |    |    |    |    |
|----|----|----|----|----|
|    | 00 | 01 | 11 | 10 |
| 00 |    |    |    |    |
| 01 |    |    |    |    |
| 11 |    |    |    |    |
| 10 |    |    |    |    |

|    |    |    |    |    |
|----|----|----|----|----|
|    | 00 | 01 | 11 | 10 |
| 00 |    |    |    |    |
| 01 |    |    |    |    |
| 11 |    |    |    |    |
| 10 |    |    |    |    |

|    |    |    |    |    |
|----|----|----|----|----|
|    | 00 | 01 | 11 | 10 |
| 00 |    |    |    |    |
| 01 |    |    |    |    |
| 11 |    |    |    |    |
| 10 |    |    |    |    |

|    |    |    |    |    |
|----|----|----|----|----|
|    | 00 | 01 | 11 | 10 |
| 00 |    |    |    |    |
| 01 |    |    |    |    |
| 11 |    |    |    |    |
| 10 |    |    |    |    |

|    |    |    |    |    |
|----|----|----|----|----|
|    | 00 | 01 | 11 | 10 |
| 00 |    |    |    |    |
| 01 |    |    |    |    |
| 11 |    |    |    |    |
| 10 |    |    |    |    |

|    |    |    |    |    |
|----|----|----|----|----|
|    | 00 | 01 | 11 | 10 |
| 00 |    |    |    |    |
| 01 |    |    |    |    |
| 11 |    |    |    |    |
| 10 |    |    |    |    |

Circuit Excitation Table

| Present State/Inputs |   |   |   |   | Next State |  |  |  | Flip-flop Inputs and Circuit Outputs |  |  |  |  |  |  |  |  |  |  |  |
|----------------------|---|---|---|---|------------|--|--|--|--------------------------------------|--|--|--|--|--|--|--|--|--|--|--|
| 0                    | 0 | 0 | 0 | 0 |            |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 0                    | 0 | 0 | 0 | 1 |            |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 0                    | 0 | 0 | 1 | 0 |            |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 0                    | 0 | 0 | 1 | 1 |            |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 0                    | 0 | 1 | 0 | 0 |            |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 0                    | 0 | 1 | 0 | 1 |            |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 0                    | 0 | 1 | 1 | 0 |            |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 0                    | 0 | 1 | 1 | 1 |            |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 0                    | 1 | 0 | 0 | 0 |            |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 0                    | 1 | 0 | 0 | 1 |            |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 0                    | 1 | 0 | 1 | 0 |            |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 0                    | 1 | 0 | 1 | 1 |            |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 0                    | 1 | 1 | 0 | 0 |            |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 0                    | 1 | 1 | 0 | 1 |            |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 0                    | 1 | 1 | 1 | 0 |            |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 0                    | 1 | 1 | 1 | 1 |            |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 1                    | 0 | 0 | 0 | 0 |            |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 1                    | 0 | 0 | 0 | 1 |            |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 1                    | 0 | 0 | 1 | 0 |            |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 1                    | 0 | 0 | 1 | 1 |            |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 1                    | 0 | 1 | 0 | 0 |            |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 1                    | 0 | 1 | 0 | 1 |            |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 1                    | 0 | 1 | 1 | 0 |            |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 1                    | 0 | 1 | 1 | 1 |            |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 1                    | 1 | 0 | 0 | 0 |            |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 1                    | 1 | 0 | 0 | 1 |            |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 1                    | 1 | 0 | 1 | 0 |            |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 1                    | 1 | 0 | 1 | 1 |            |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 1                    | 1 | 1 | 0 | 0 |            |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 1                    | 1 | 1 | 0 | 1 |            |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 1                    | 1 | 1 | 1 | 0 |            |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |
| 1                    | 1 | 1 | 1 | 1 |            |  |  |  |                                      |  |  |  |  |  |  |  |  |  |  |  |

Flip-flop Excitation Tables

| Q(t) | Q(t+1) | J | K | S | R | D | T |
|------|--------|---|---|---|---|---|---|
| 0    | 0      | 0 | X | 0 | X | 0 | 0 |
| 0    | 1      | 1 | X | 1 | 0 | 1 | 1 |
| 1    | 0      | X | 1 | 0 | 1 | 0 | 1 |
| 1    | 1      | X | 0 | X | 0 | 1 | 0 |

# Flip-flop Input Functions and Circuit Output Functions

|    |     |     |     |     |
|----|-----|-----|-----|-----|
|    | 000 | 001 | 011 | 010 |
| 00 |     |     |     |     |
| 01 |     |     |     |     |
| 11 |     |     |     |     |
| 10 |     |     |     |     |

|  |     |     |     |     |
|--|-----|-----|-----|-----|
|  | 100 | 101 | 111 | 110 |
|  |     |     |     |     |
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|  |     |     |     |     |
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|    |     |     |     |     |
|----|-----|-----|-----|-----|
|    | 000 | 001 | 011 | 010 |
| 00 |     |     |     |     |
| 01 |     |     |     |     |
| 11 |     |     |     |     |
| 10 |     |     |     |     |

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|--|-----|-----|-----|-----|
|  | 100 | 101 | 111 | 110 |
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|    |     |     |     |     |
|----|-----|-----|-----|-----|
|    | 000 | 001 | 011 | 010 |
| 00 |     |     |     |     |
| 01 |     |     |     |     |
| 11 |     |     |     |     |
| 10 |     |     |     |     |

|  |     |     |     |     |
|--|-----|-----|-----|-----|
|  | 100 | 101 | 111 | 110 |
|  |     |     |     |     |
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|    |     |     |     |     |
|----|-----|-----|-----|-----|
|    | 000 | 001 | 011 | 010 |
| 00 |     |     |     |     |
| 01 |     |     |     |     |
| 11 |     |     |     |     |
| 10 |     |     |     |     |

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|--|-----|-----|-----|-----|
|  | 100 | 101 | 111 | 110 |
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|----|-----|-----|-----|-----|
|    | 000 | 001 | 011 | 010 |
| 00 |     |     |     |     |
| 01 |     |     |     |     |
| 11 |     |     |     |     |
| 10 |     |     |     |     |

|  |     |     |     |     |
|--|-----|-----|-----|-----|
|  | 100 | 101 | 111 | 110 |
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|    |     |     |     |     |
|----|-----|-----|-----|-----|
|    | 000 | 001 | 011 | 010 |
| 00 |     |     |     |     |
| 01 |     |     |     |     |
| 11 |     |     |     |     |
| 10 |     |     |     |     |

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|--|-----|-----|-----|-----|
|  | 100 | 101 | 111 | 110 |
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|    |     |     |     |     |
|----|-----|-----|-----|-----|
|    | 000 | 001 | 011 | 010 |
| 00 |     |     |     |     |
| 01 |     |     |     |     |
| 11 |     |     |     |     |
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|  |     |     |     |     |
|--|-----|-----|-----|-----|
|  | 100 | 101 | 111 | 110 |
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|    |     |     |     |     |
|----|-----|-----|-----|-----|
|    | 000 | 001 | 011 | 010 |
| 00 |     |     |     |     |
| 01 |     |     |     |     |
| 11 |     |     |     |     |
| 10 |     |     |     |     |

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|--|-----|-----|-----|-----|
|  | 100 | 101 | 111 | 110 |
|  |     |     |     |     |
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|    |     |     |     |     |
|----|-----|-----|-----|-----|
|    | 000 | 001 | 011 | 010 |
| 00 |     |     |     |     |
| 01 |     |     |     |     |
| 11 |     |     |     |     |
| 10 |     |     |     |     |

|  |     |     |     |     |
|--|-----|-----|-----|-----|
|  | 100 | 101 | 111 | 110 |
|  |     |     |     |     |
|  |     |     |     |     |
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|    |     |     |     |     |
|----|-----|-----|-----|-----|
|    | 000 | 001 | 011 | 010 |
| 00 |     |     |     |     |
| 01 |     |     |     |     |
| 11 |     |     |     |     |
| 10 |     |     |     |     |

|  |     |     |     |     |
|--|-----|-----|-----|-----|
|  | 100 | 101 | 111 | 110 |
|  |     |     |     |     |
|  |     |     |     |     |
|  |     |     |     |     |
|  |     |     |     |     |



## Flip-flop Input Functions and Circuit Output Functions

|     | 000 | 001 | 011 | 010 |
|-----|-----|-----|-----|-----|
| 000 |     |     |     |     |
| 001 |     |     |     |     |
| 011 |     |     |     |     |
| 010 |     |     |     |     |
| 100 |     |     |     |     |
| 101 |     |     |     |     |
| 111 |     |     |     |     |
| 110 |     |     |     |     |

|     | 000 | 001 | 011 | 010 |
|-----|-----|-----|-----|-----|
| 000 |     |     |     |     |
| 001 |     |     |     |     |
| 011 |     |     |     |     |
| 010 |     |     |     |     |
| 100 |     |     |     |     |
| 101 |     |     |     |     |
| 111 |     |     |     |     |
| 110 |     |     |     |     |

|     | 000 | 001 | 011 | 010 |
|-----|-----|-----|-----|-----|
| 000 |     |     |     |     |
| 001 |     |     |     |     |
| 011 |     |     |     |     |
| 010 |     |     |     |     |
| 100 |     |     |     |     |
| 101 |     |     |     |     |
| 111 |     |     |     |     |
| 110 |     |     |     |     |

|     | 000 | 001 | 011 | 010 |
|-----|-----|-----|-----|-----|
| 000 |     |     |     |     |
| 001 |     |     |     |     |
| 011 |     |     |     |     |
| 010 |     |     |     |     |
| 100 |     |     |     |     |
| 101 |     |     |     |     |
| 111 |     |     |     |     |
| 110 |     |     |     |     |

|     | 000 | 001 | 011 | 010 |
|-----|-----|-----|-----|-----|
| 000 |     |     |     |     |
| 001 |     |     |     |     |
| 011 |     |     |     |     |
| 010 |     |     |     |     |
| 100 |     |     |     |     |
| 101 |     |     |     |     |
| 111 |     |     |     |     |
| 110 |     |     |     |     |

|     | 000 | 001 | 011 | 010 |
|-----|-----|-----|-----|-----|
| 000 |     |     |     |     |
| 001 |     |     |     |     |
| 011 |     |     |     |     |
| 010 |     |     |     |     |
| 100 |     |     |     |     |
| 101 |     |     |     |     |
| 111 |     |     |     |     |
| 110 |     |     |     |     |