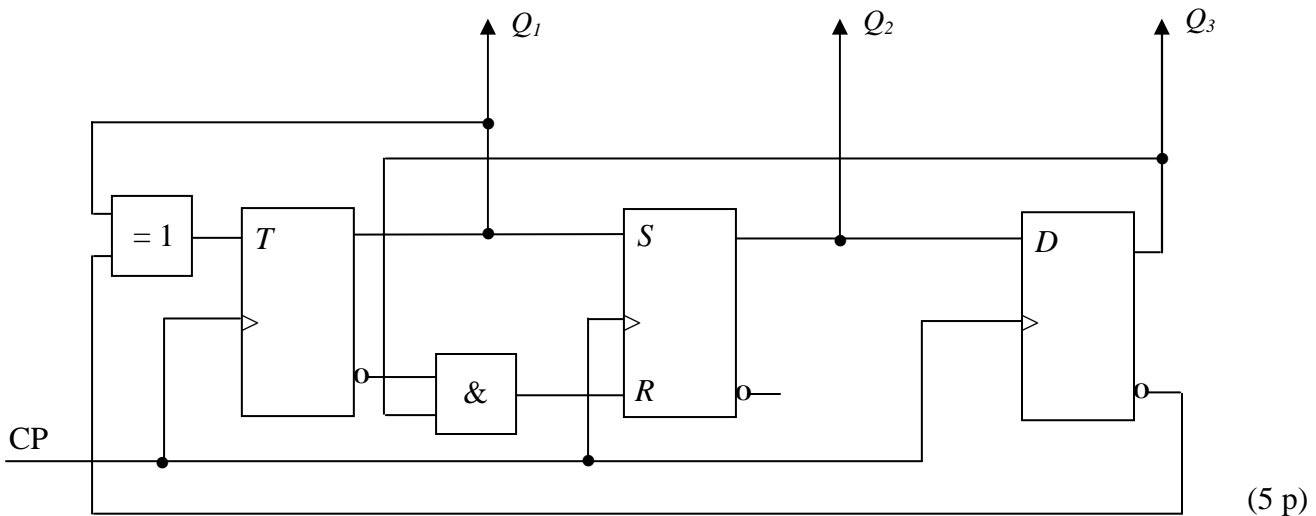


**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

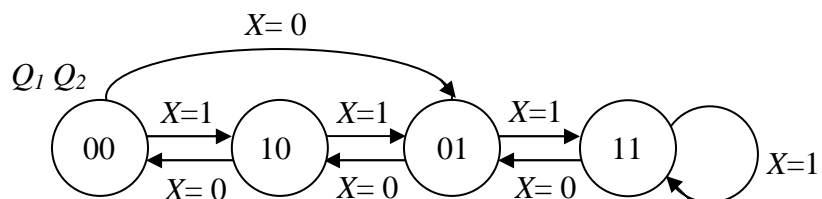
För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.



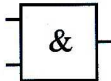
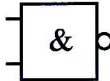
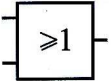
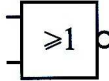
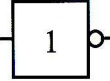
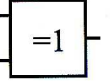
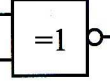


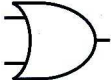
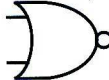
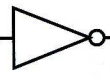
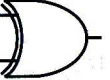
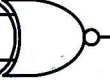
(5 p)

2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

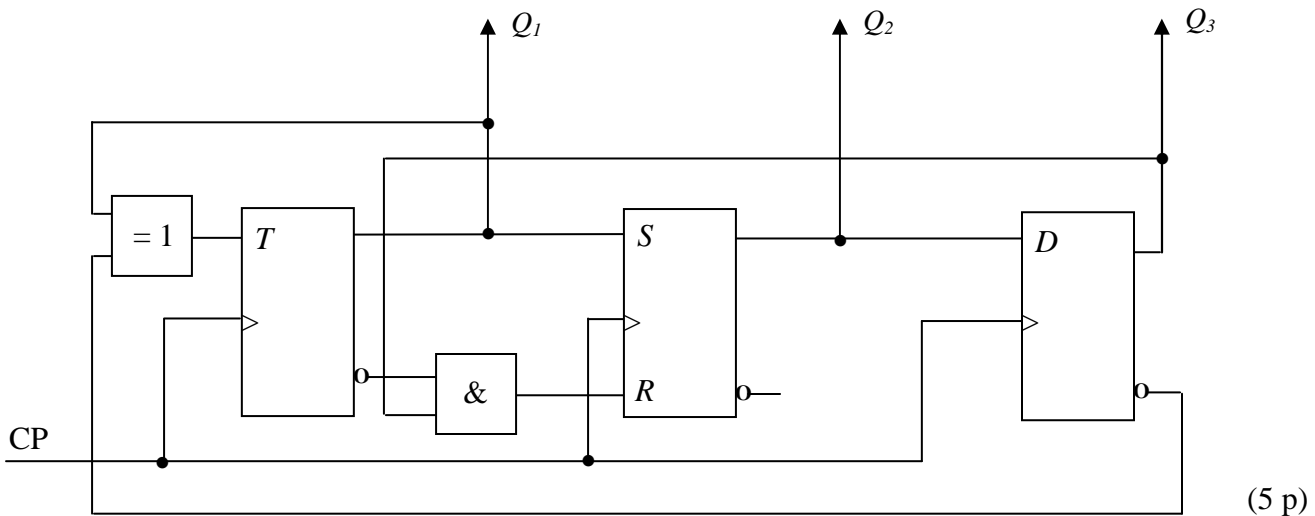
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|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
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**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

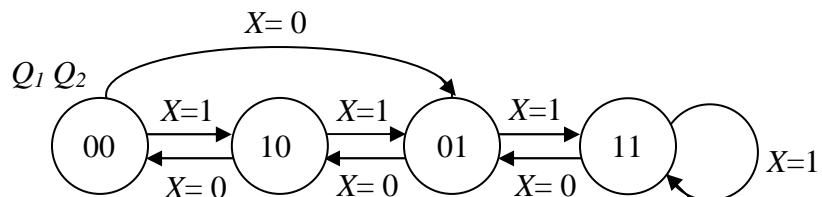
För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.



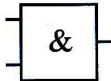
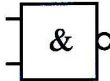
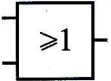
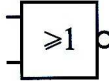
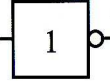
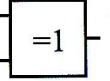
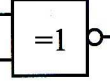


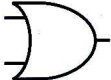
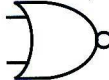
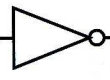
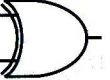
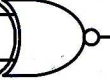
(5 p)

2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

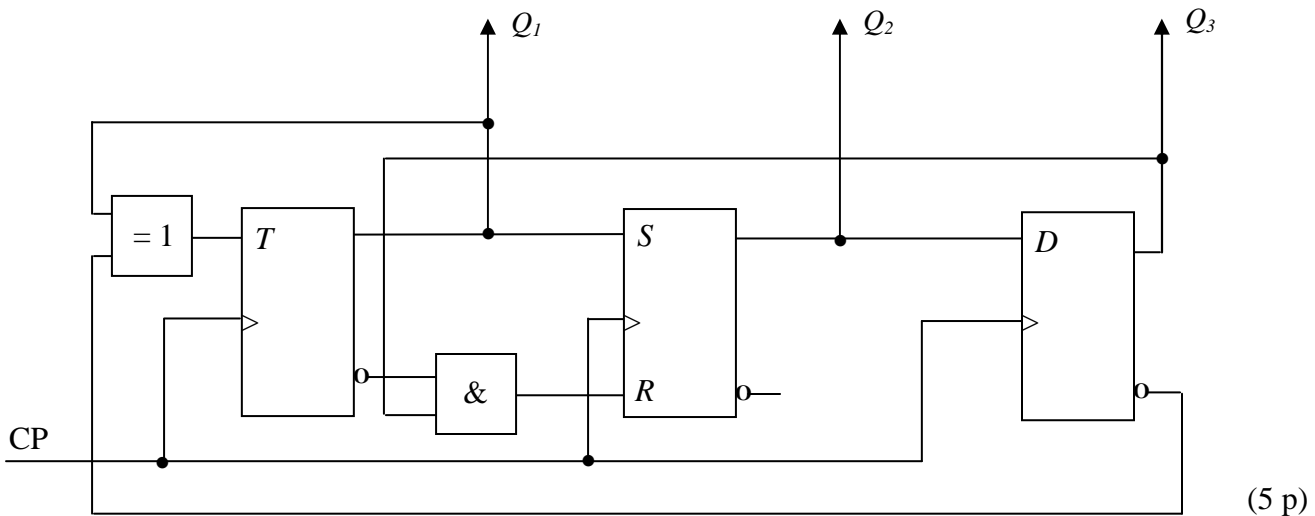
|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |

**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

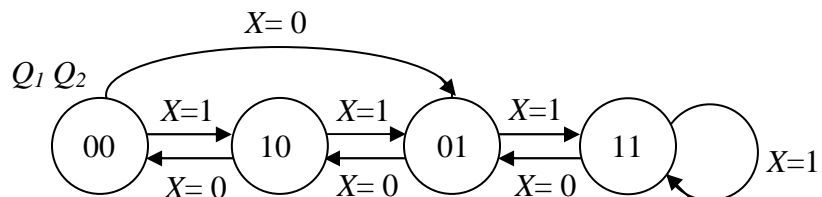
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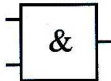
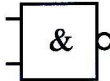
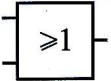
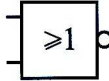
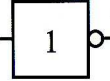
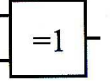
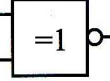


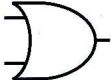
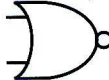
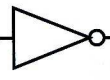
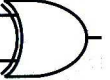
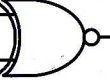
(5 p)

2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

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|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

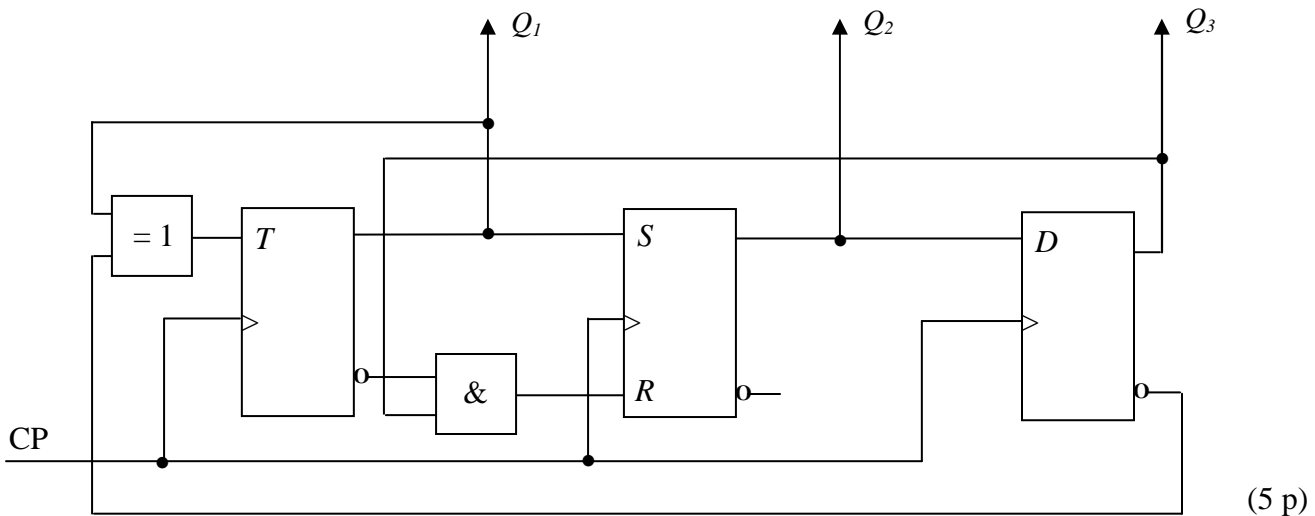
|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
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**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

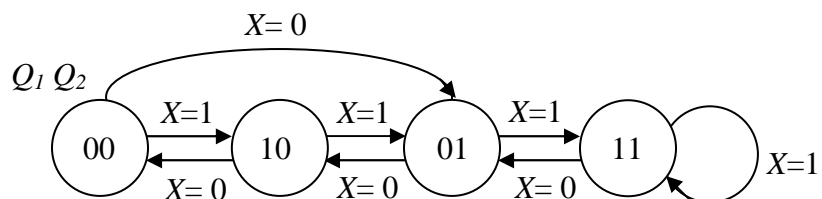
För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

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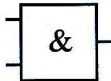
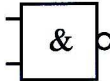
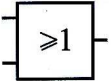
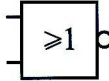
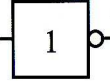
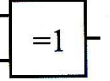
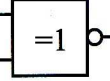


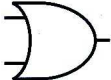
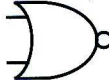
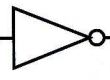
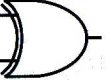
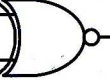
(5 p)

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(5 p)

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|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

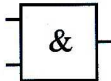
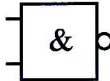
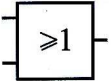
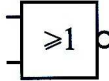
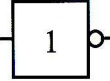
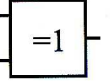
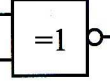


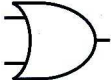
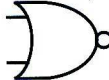
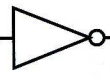
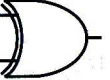
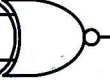
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| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
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| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
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| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |





### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

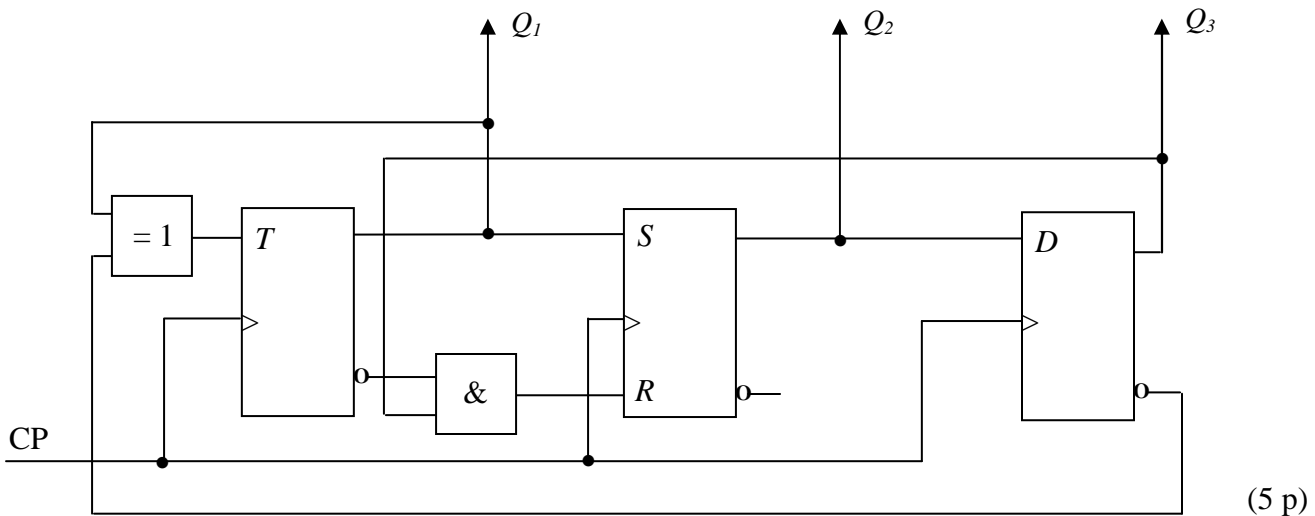
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| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
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**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

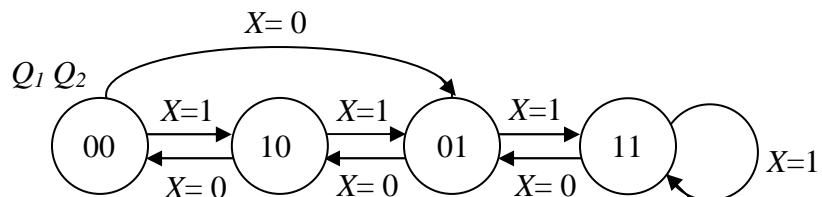
För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.



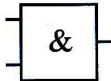
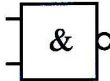
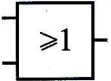
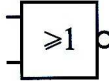
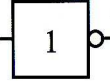
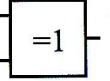
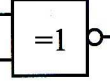


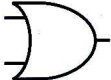
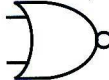
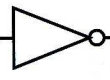
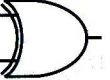
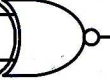
(5 p)

2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

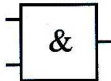
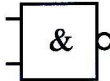
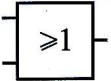
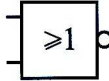
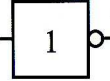
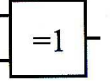
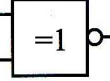


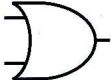
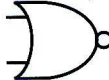
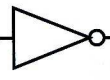
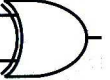
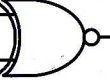
### Tabeller över vippor

|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
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| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
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| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |



### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

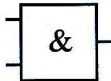
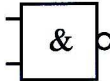
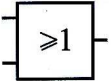
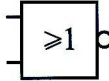
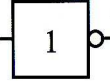
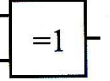
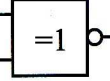


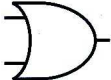
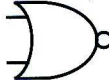
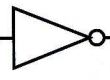
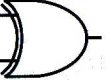
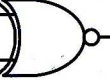
### Tabeller över vippor

|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
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| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |



### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
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| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
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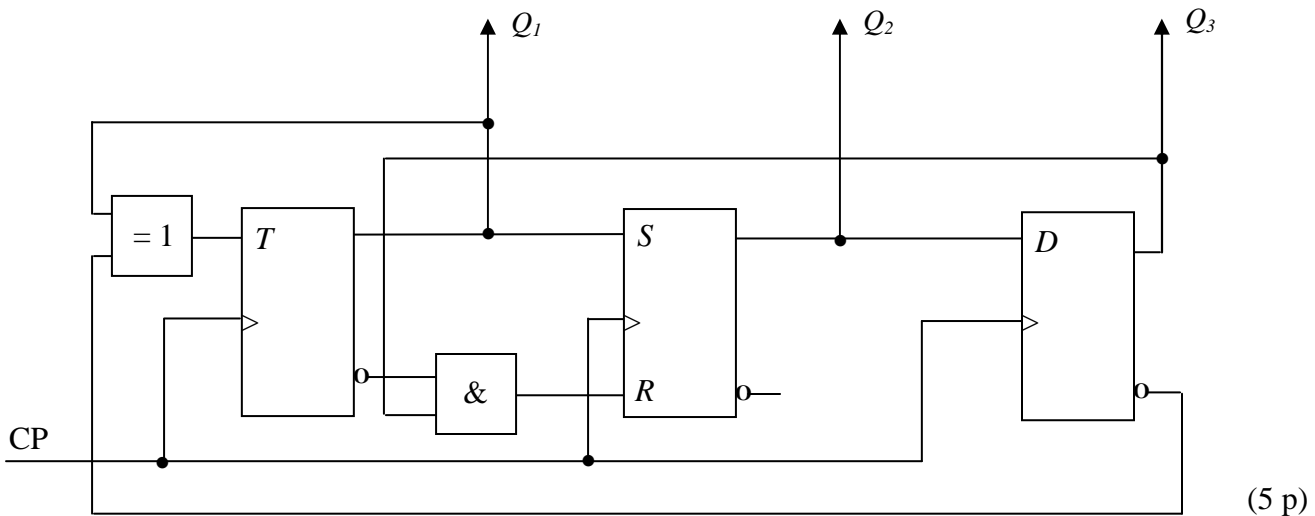
|     |     |     |     |     |     |     |       |
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| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |



**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

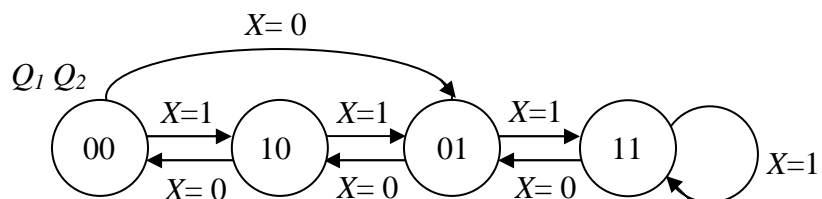
För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.



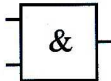
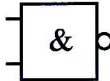
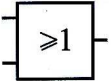
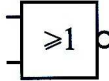
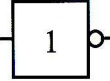
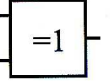
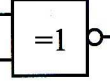


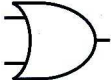
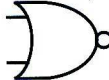
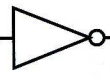
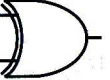
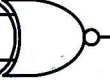
(5 p)

2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

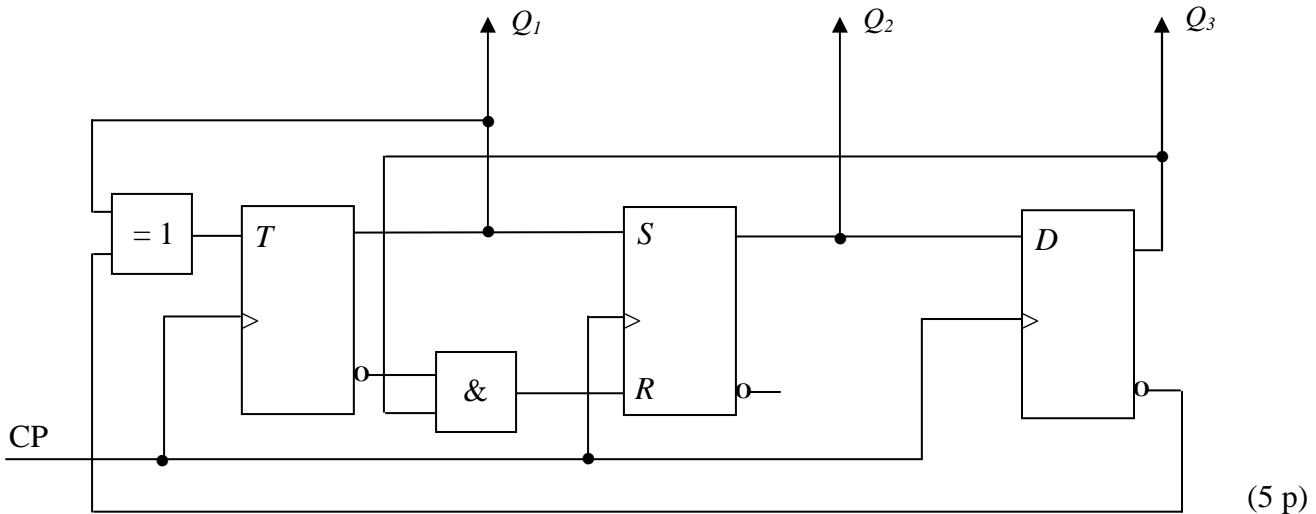
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|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
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**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

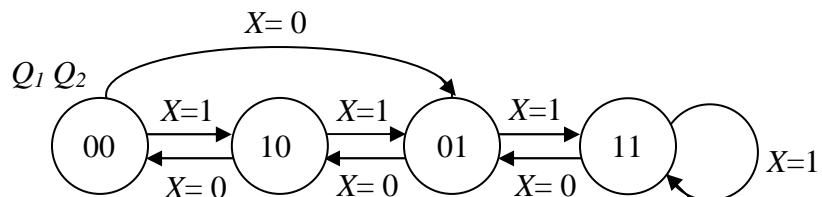
För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

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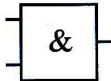
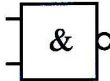
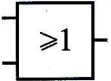
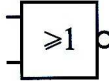
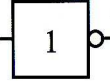
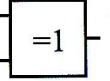
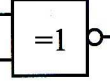


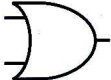
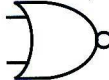
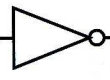
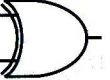
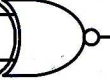
(5 p)

2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

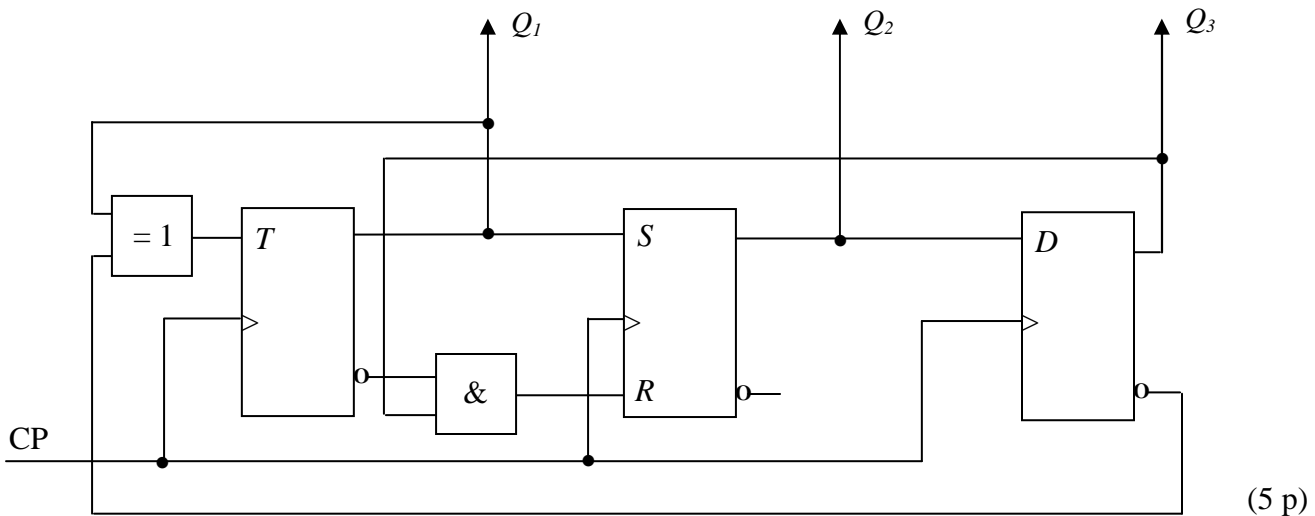
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| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
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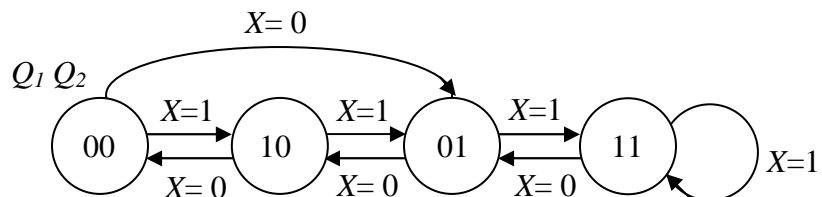
**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

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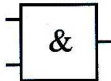
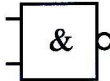
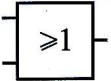
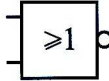
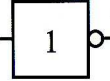
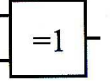
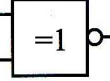


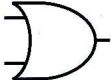
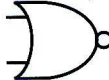
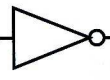
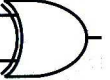
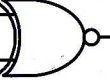


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|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

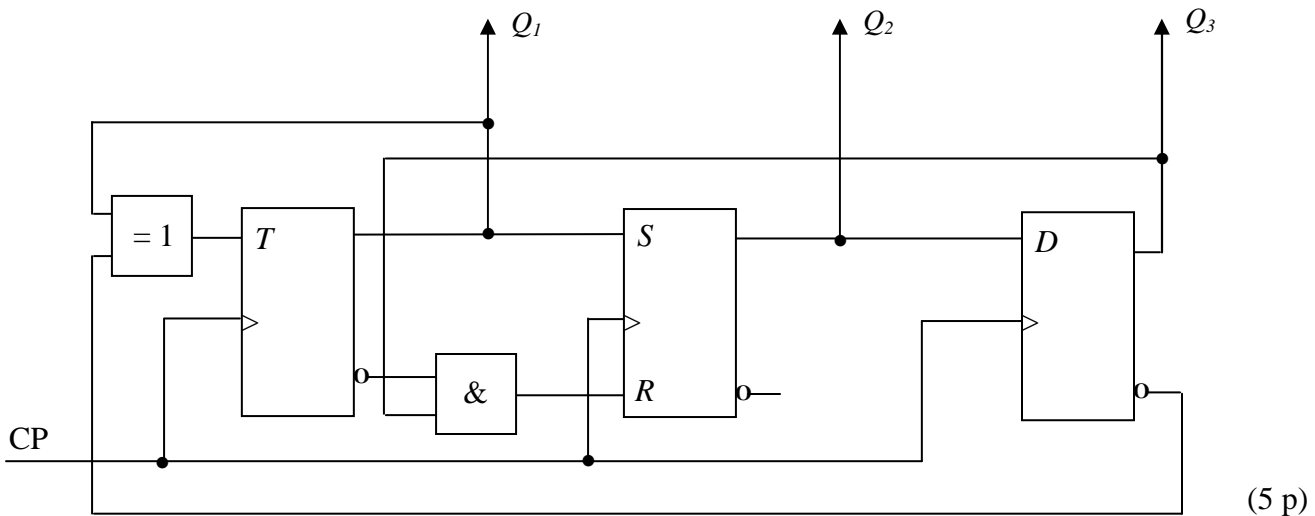
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|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |

**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

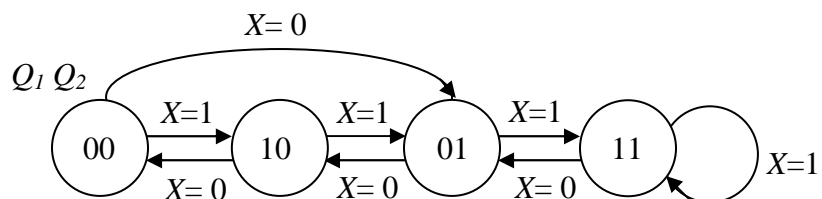
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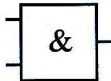
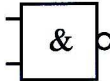
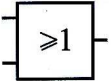
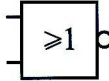
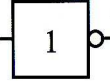
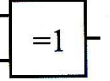
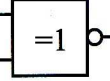


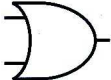
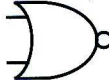
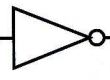
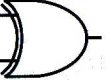
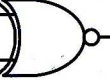
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|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

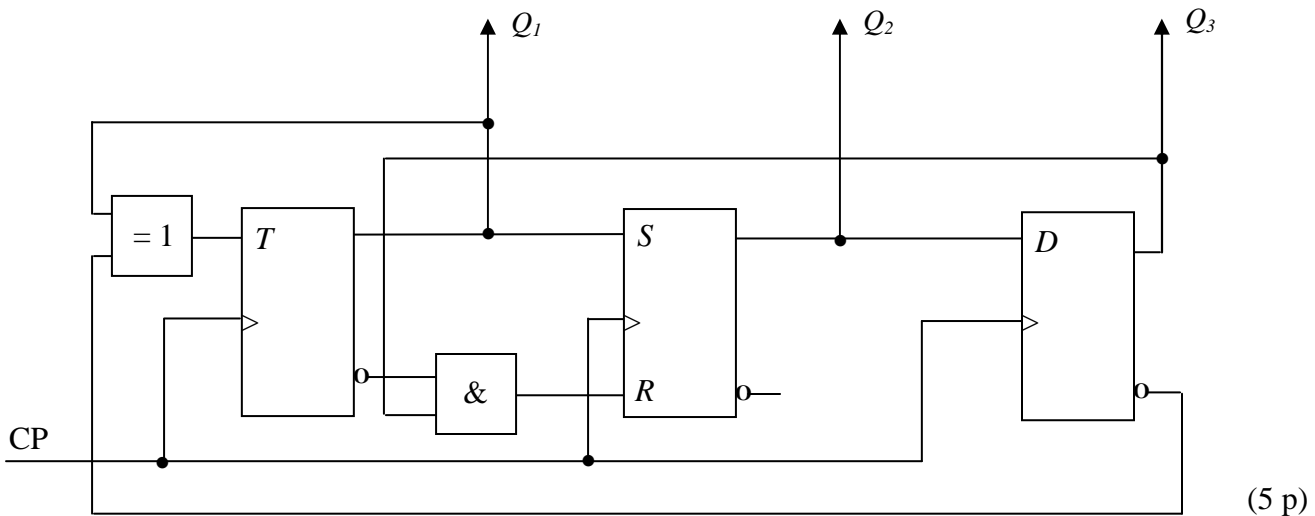
|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |



**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

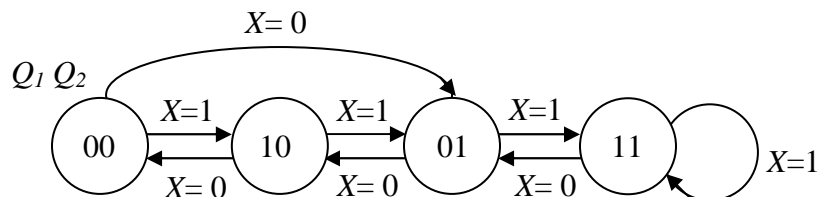
För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.



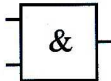
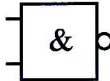
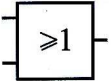
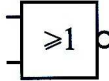
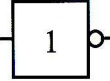
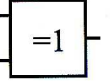
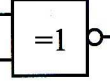


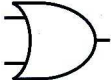
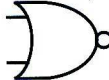
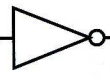
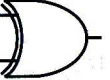
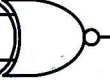
(5 p)

2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

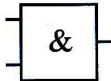
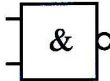
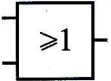
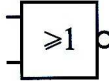
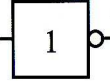
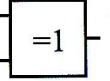
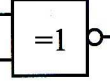


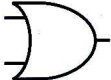
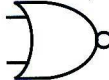
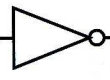
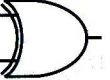
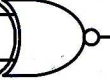
### Tabeller över vippor

|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |



### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

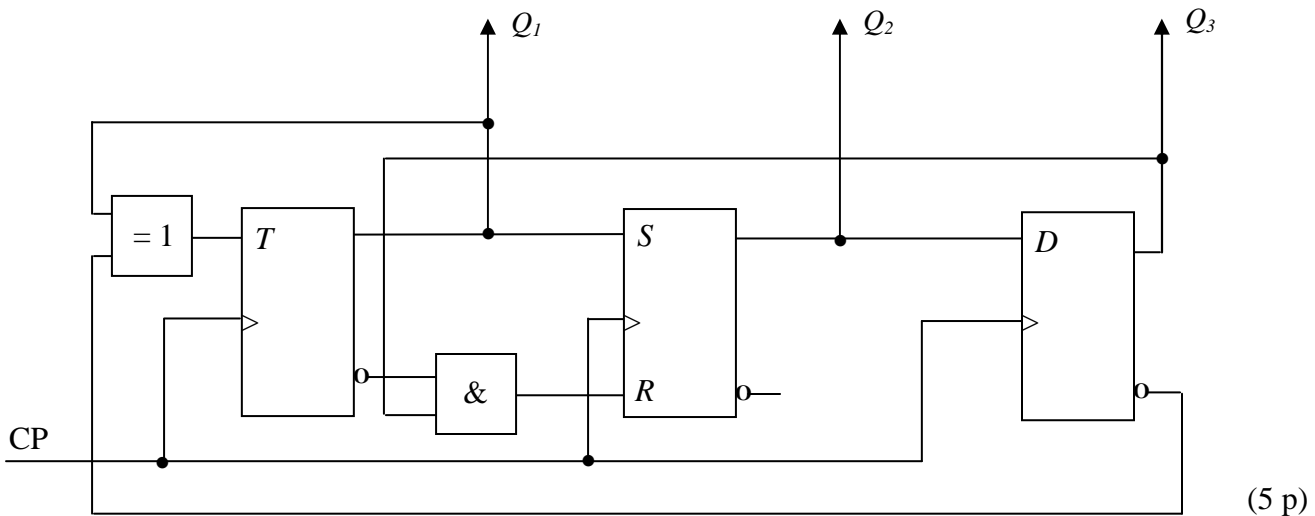
| S            | R            | Q     | J | K | Q                | D | Q | T | Q                |
|--------------|--------------|-------|---|---|------------------|---|---|---|------------------|
| 0            | 0            | $Q_0$ | 0 | 0 | $Q_0$            | 0 | 0 | 0 | $Q_0$            |
| 0            | 1            | 0     | 0 | 1 | 0                | 1 | 1 | 1 | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1 | 0 | 1                |   |   |   |                  |
| <del>1</del> | <del>1</del> |       | 1 | 1 | $\overline{Q_0}$ |   |   |   |                  |

| Q | S | R | J | K | D | T | Q <sup>+</sup> |
|---|---|---|---|---|---|---|----------------|
| 0 | 0 | - | 0 | - | 0 | 0 | 0              |
| 0 | 1 | 0 | 1 | - | 1 | 1 | 1              |
| 1 | 0 | 1 | - | 1 | 0 | 1 | 0              |
| 1 | - | 0 | - | 0 | 1 | 0 | 1              |

**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

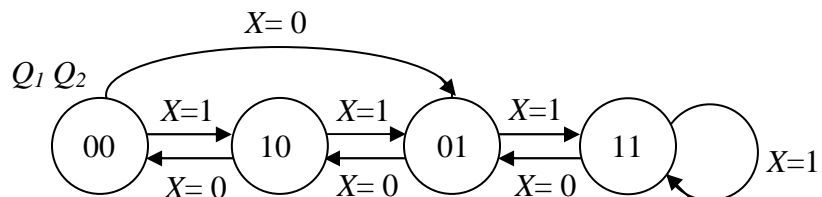
För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.



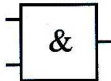
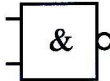
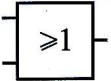
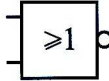
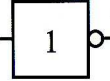
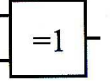
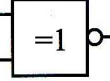


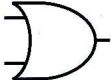
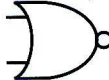
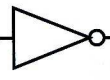
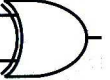
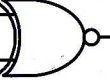
(5 p)

2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

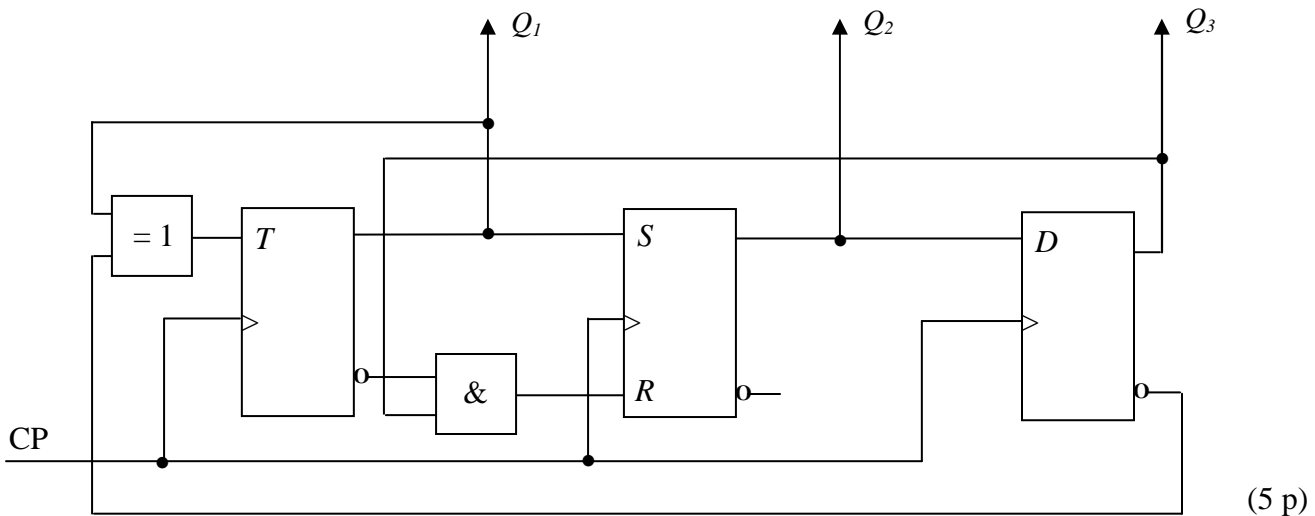
|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |

**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

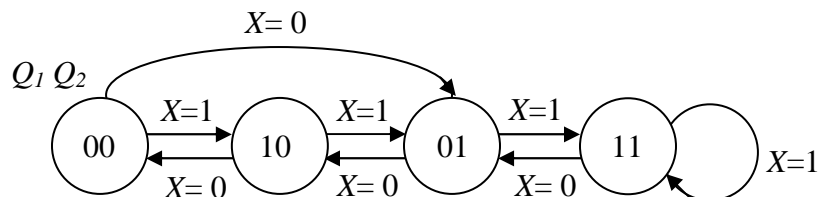
För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.



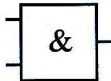
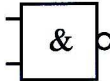
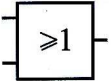
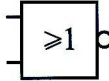
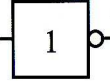
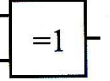
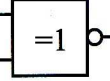


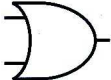
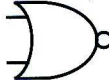
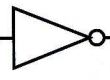
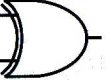
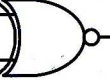
(5 p)

2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

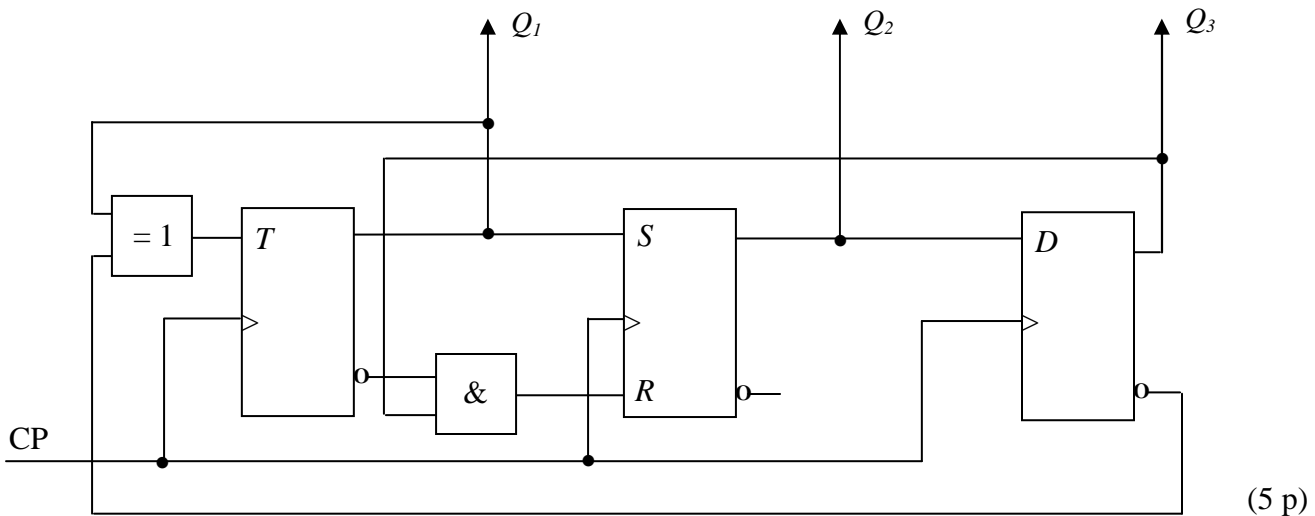
|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |



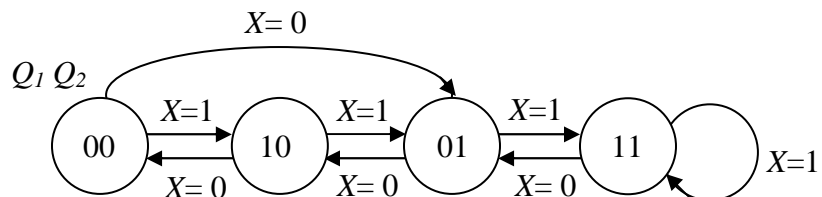
**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.

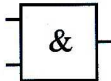
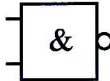
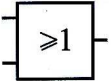
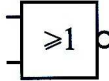
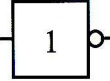
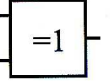
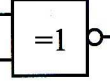


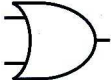
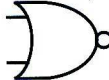
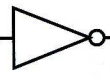
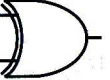
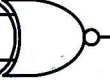


2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

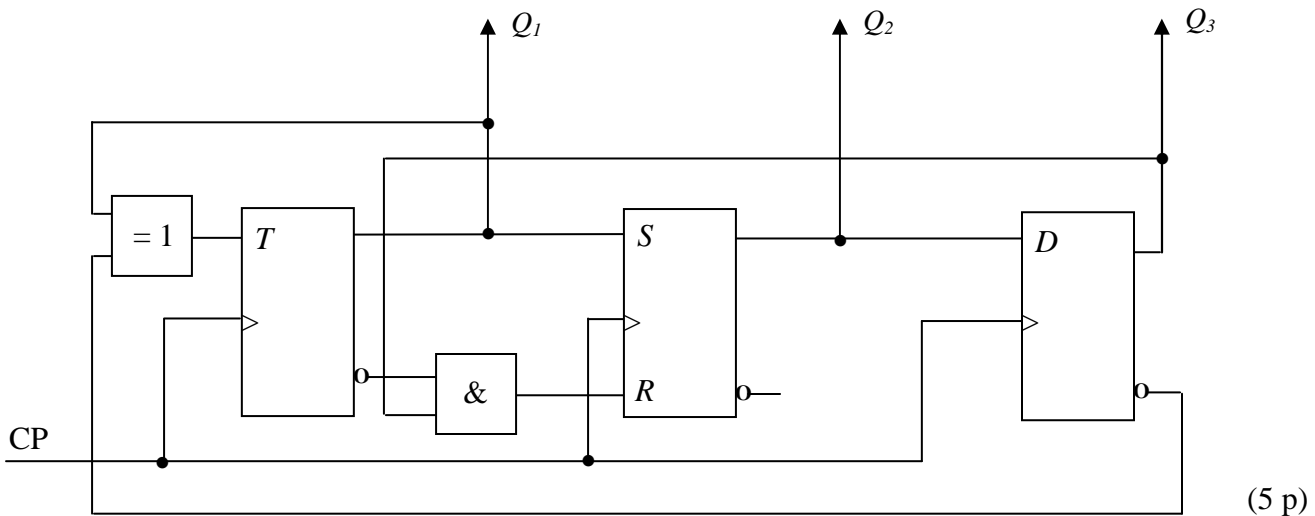
|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |

**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

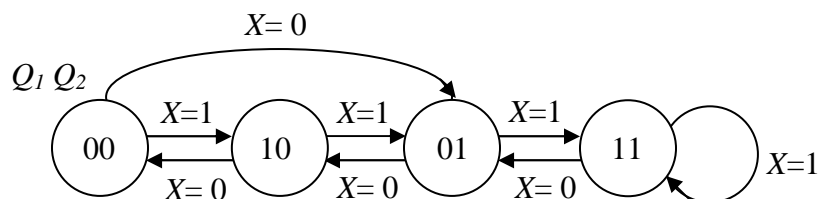
För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.



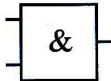
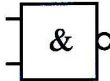
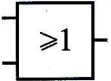
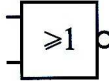
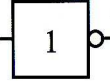
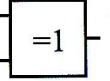
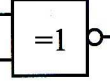


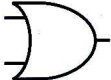
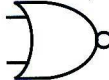
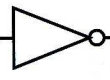
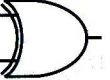
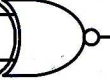
(5 p)

2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

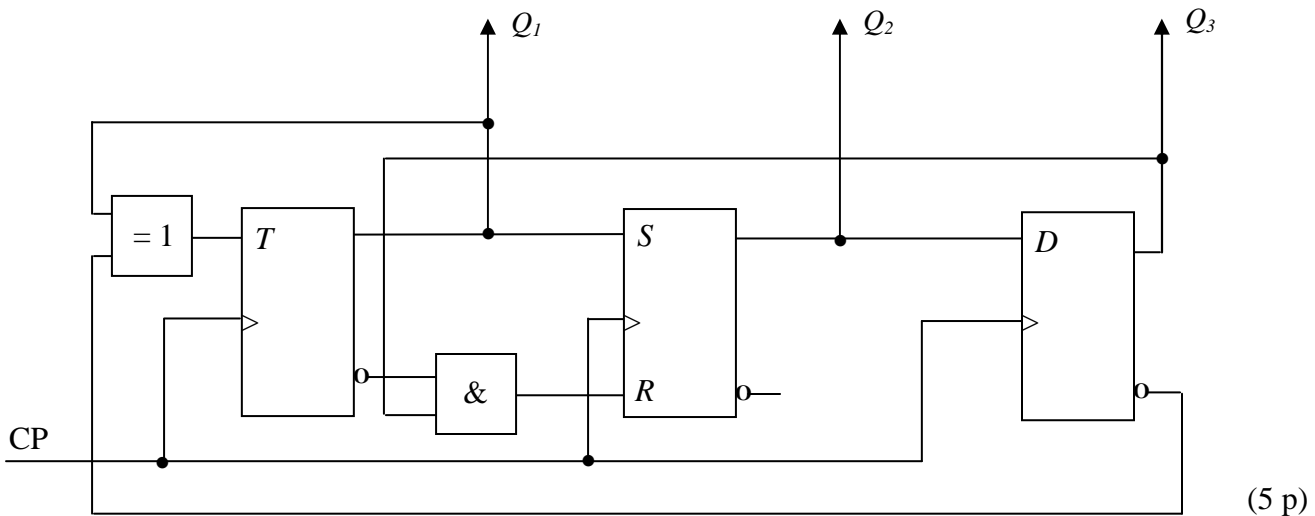
|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |

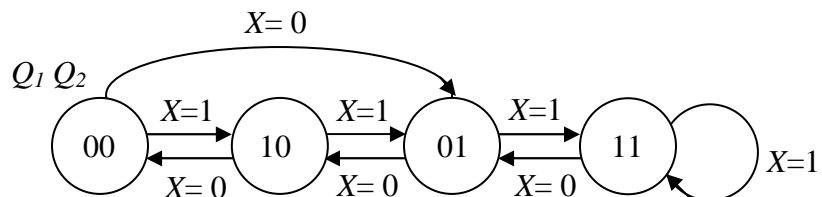
**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.



2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$ | $\overline{A \cdot B}$ | $A + B$ | $\overline{A + B}$ | $\overline{A}$ | $A \oplus B$ | $\overline{A \oplus B}$ |
|-----|---|-------------|------------------------|---------|--------------------|----------------|--------------|-------------------------|
| A   | B | AND         | NAND                   | OR      | NOR                | INVERS         | XOR          | XNOR                    |
| 0   | 0 | 0           | 1                      | 0       | 1                  |                | 0            | 1                       |
| 0   | 1 | 0           | 1                      | 1       | 0                  | 1              | 1            | 0                       |
| 1   | 0 | 0           | 1                      | 1       | 0                  | 0              | 1            | 0                       |
| 1   | 1 | 1           | 0                      | 1       | 0                  |                | 0            | 1                       |
| IEC |   |             |                        |         |                    |                |              |                         |
| USA |   |             |                        |         |                    |                |              |                         |

### Tabeller över vippor

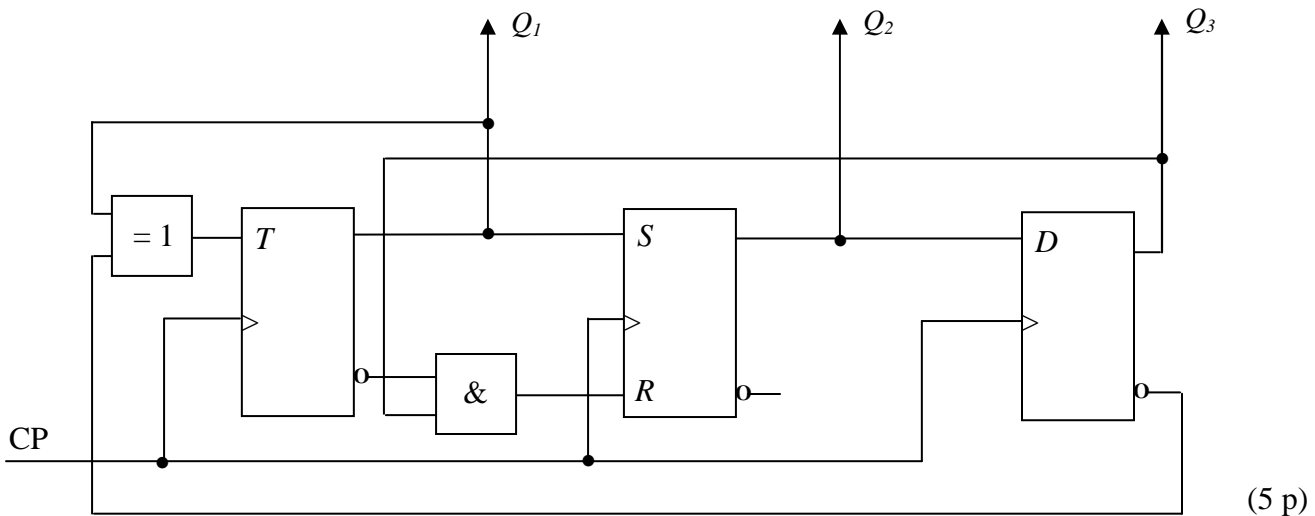
|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |

**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

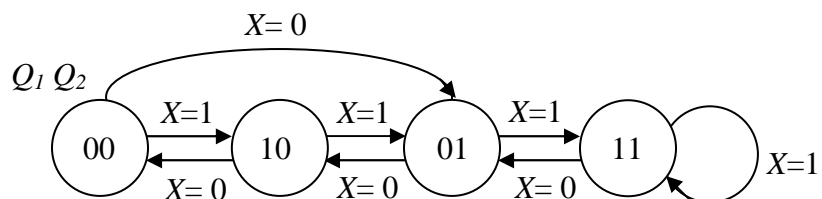
För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.



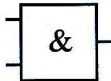
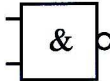
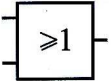
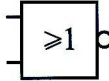
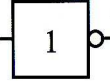
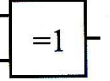
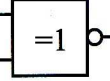


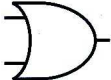
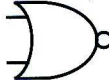
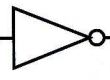
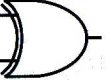
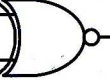
(5 p)

2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

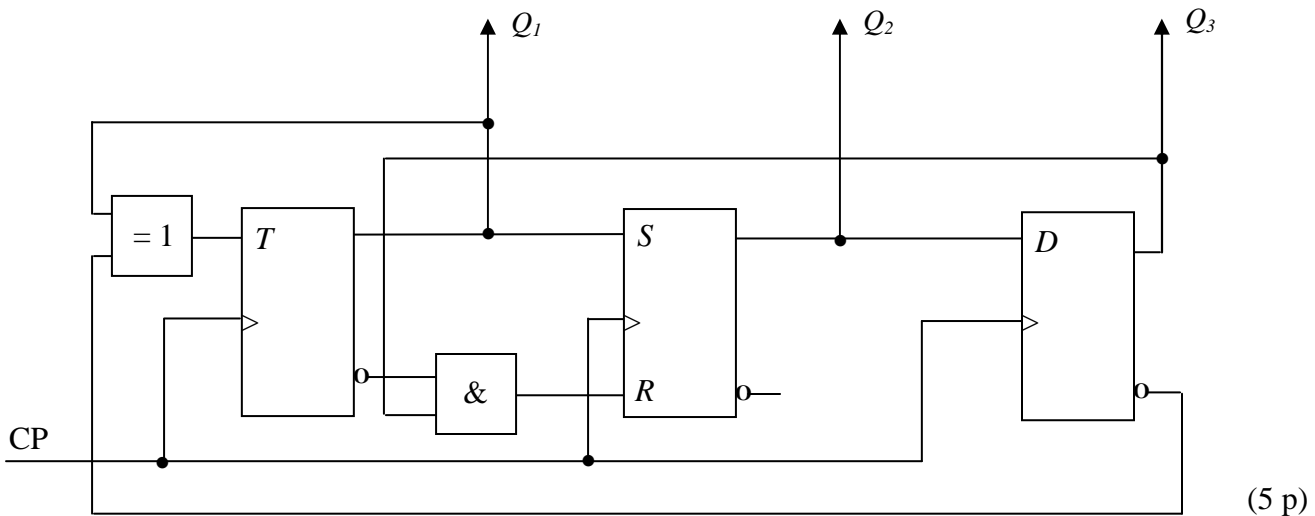
|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |



**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

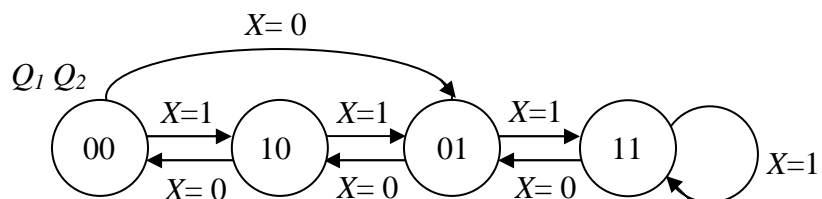
För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.



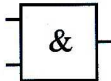
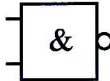
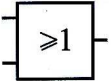
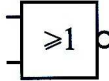
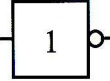
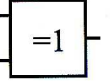
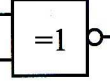


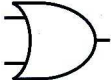
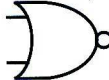
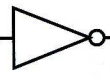
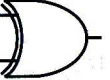
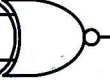
(5 p)

2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

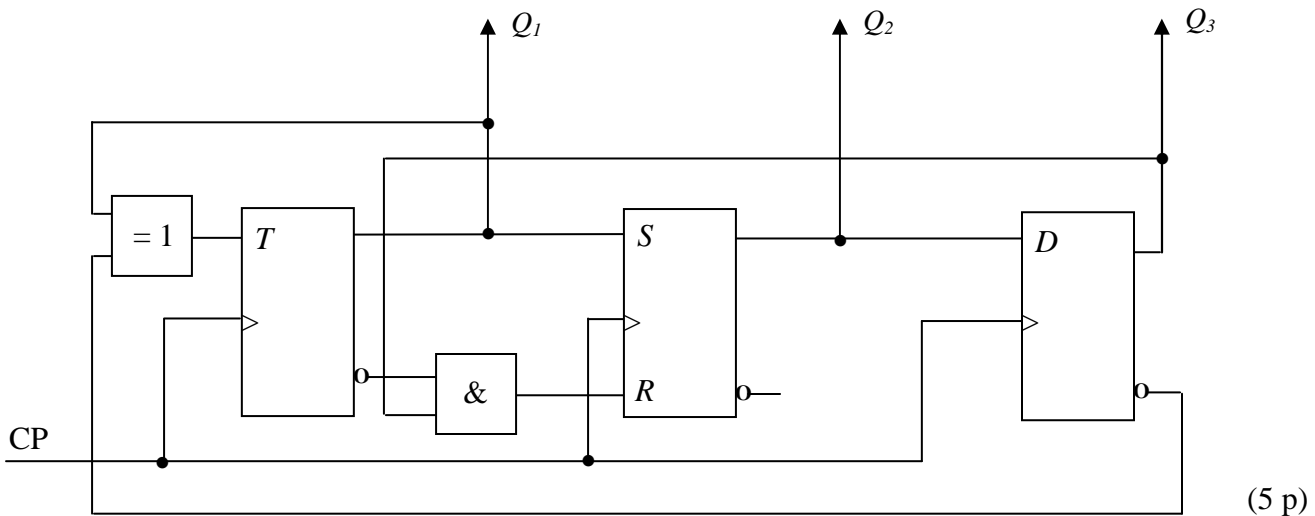
|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
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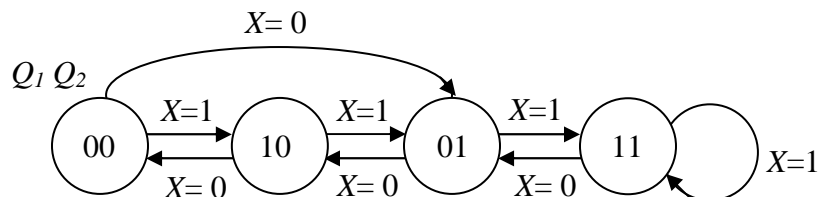
**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.

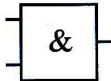
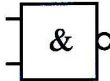
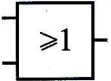
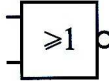
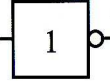
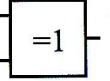
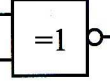


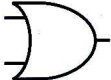
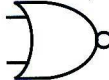
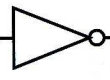
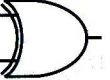
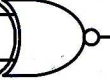


2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

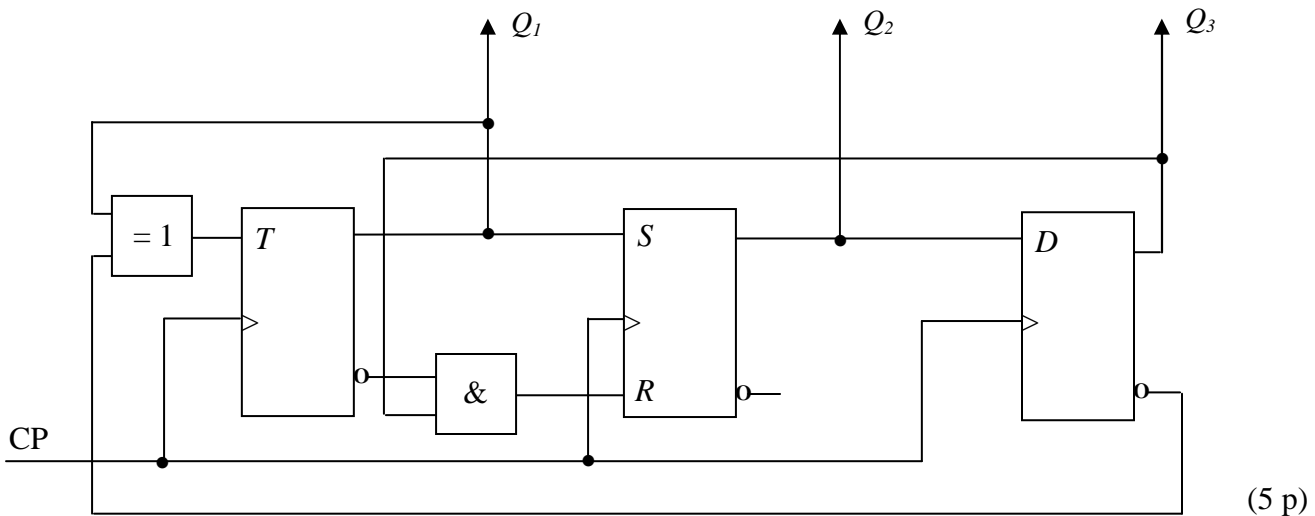
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|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
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| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
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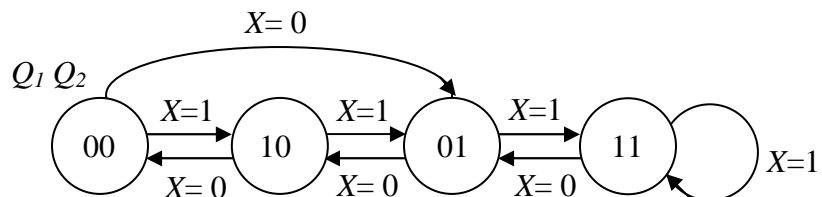
**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.

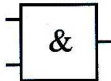
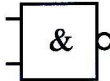
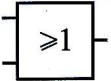
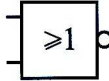
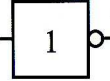
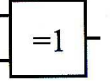
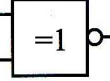


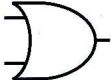
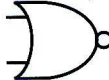
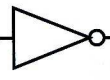
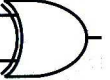
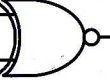


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(5 p)

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|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

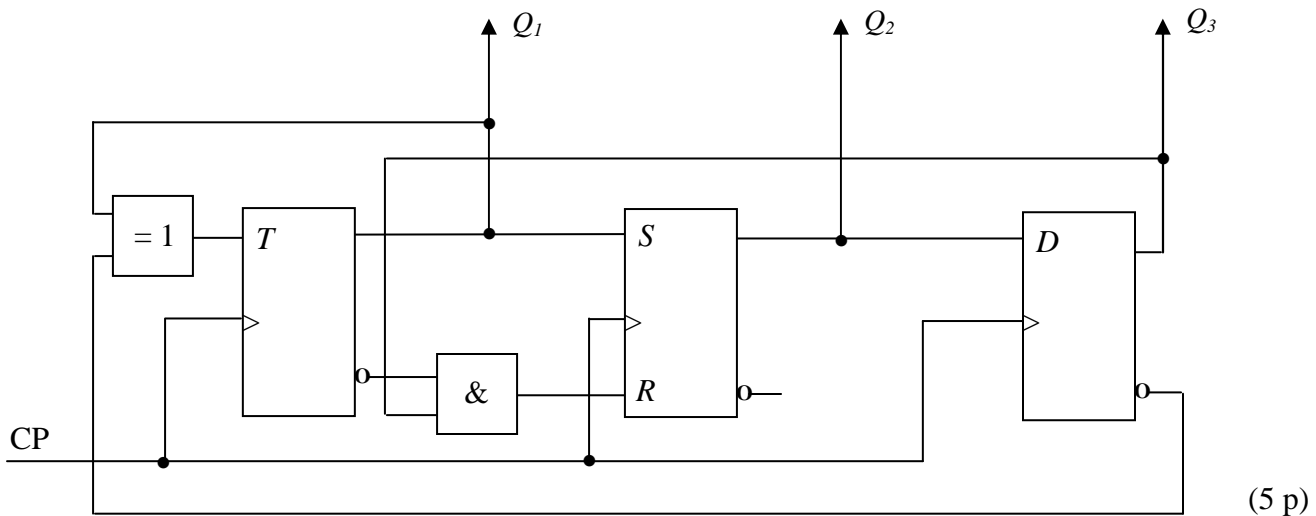
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|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
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| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |

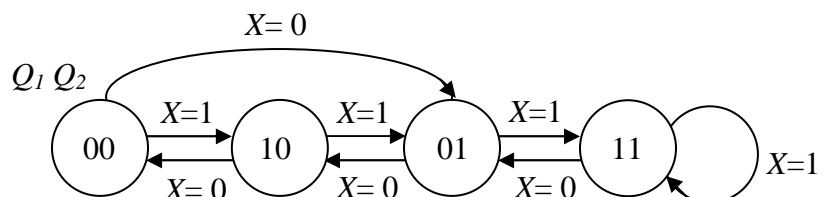
TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.

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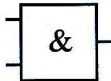
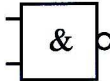
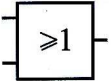
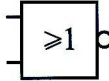
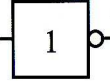
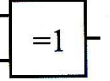
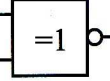


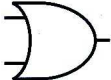
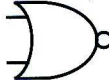
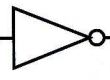
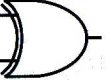
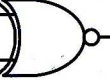


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|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

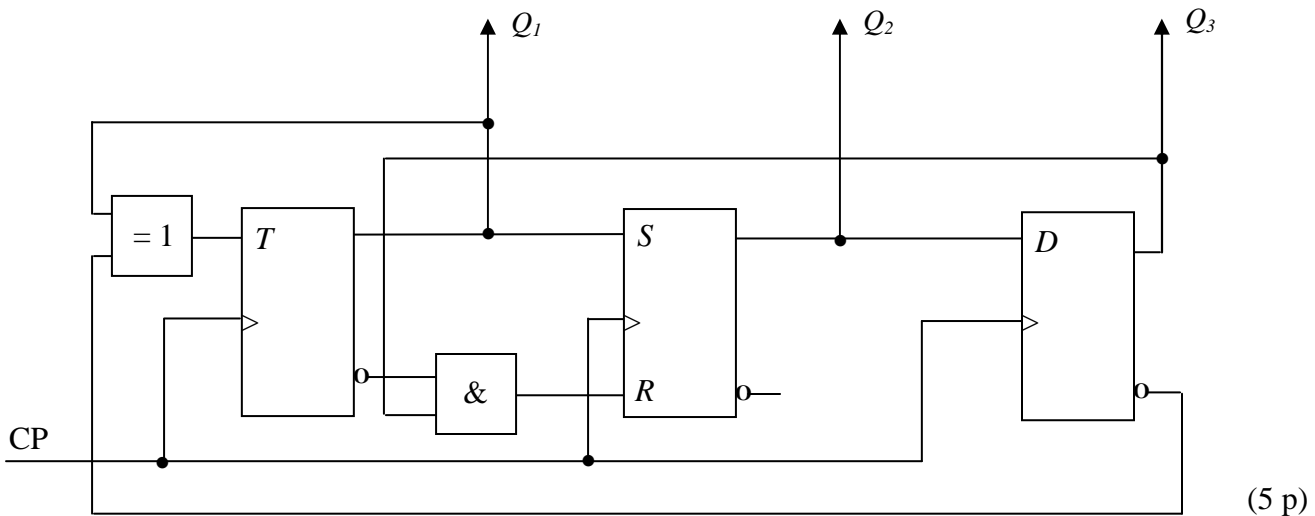
|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |



**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

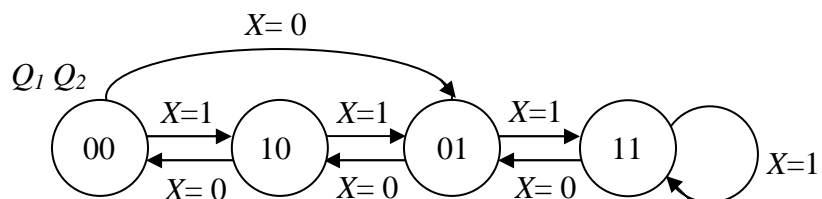
För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.



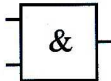
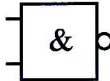
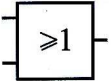
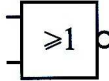
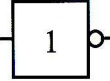
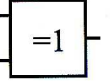
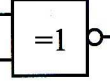


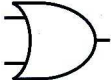
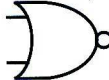
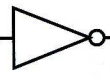
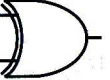
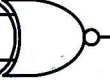
(5 p)

2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

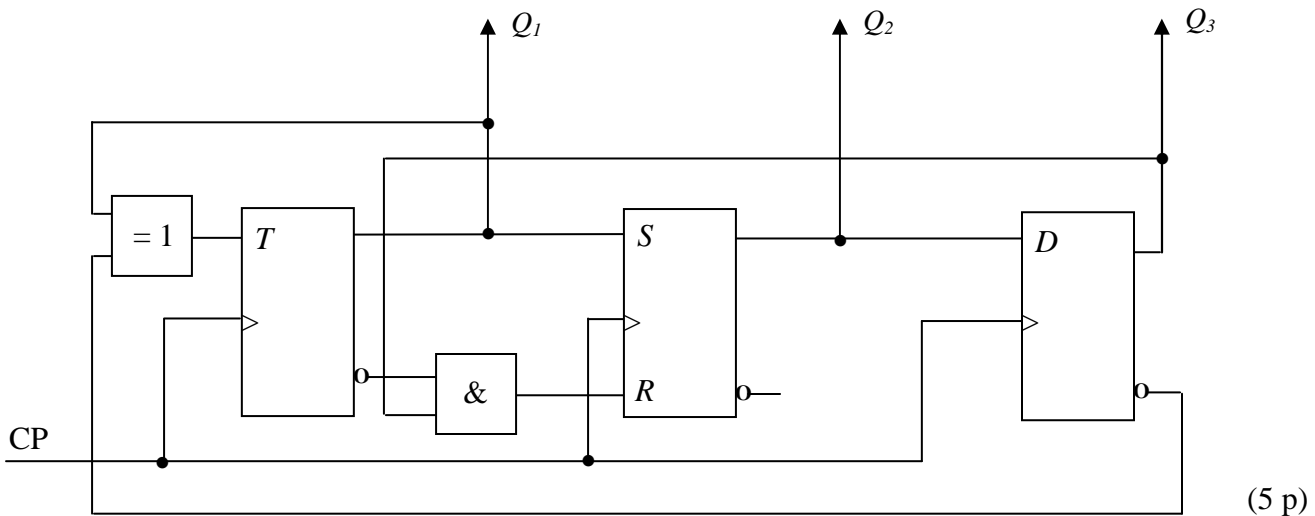
|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |

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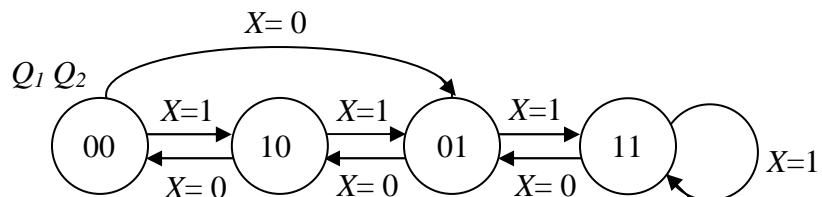
För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.



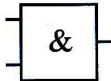
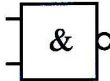
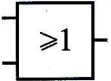
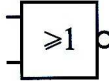
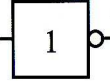
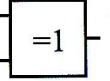
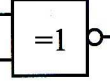


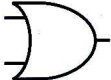
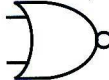
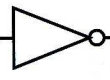
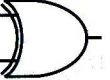
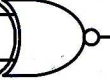
(5 p)

2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

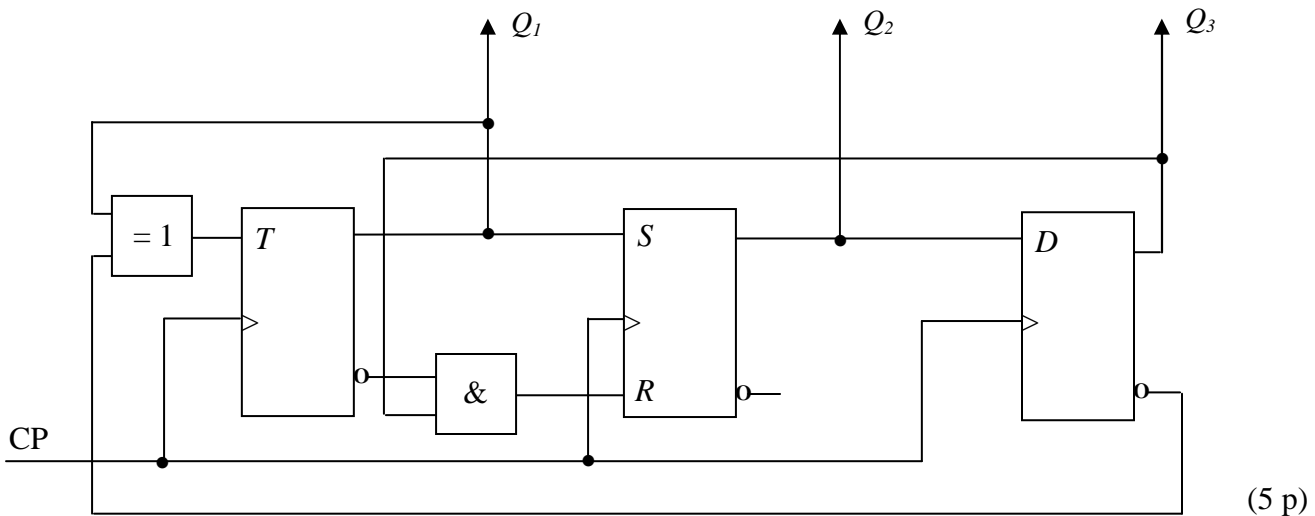
|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |

**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

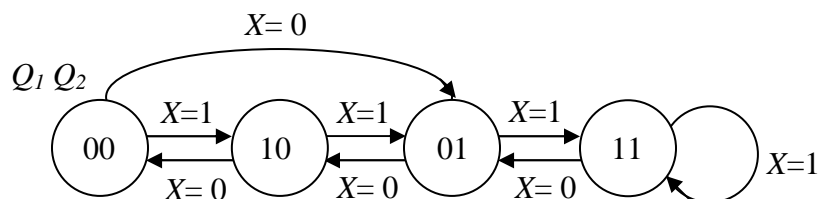
För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.



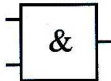
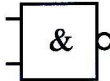
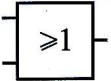
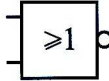
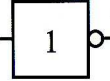
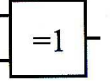
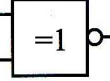


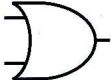
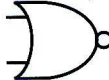
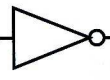
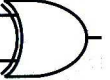
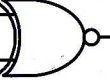
(5 p)

2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

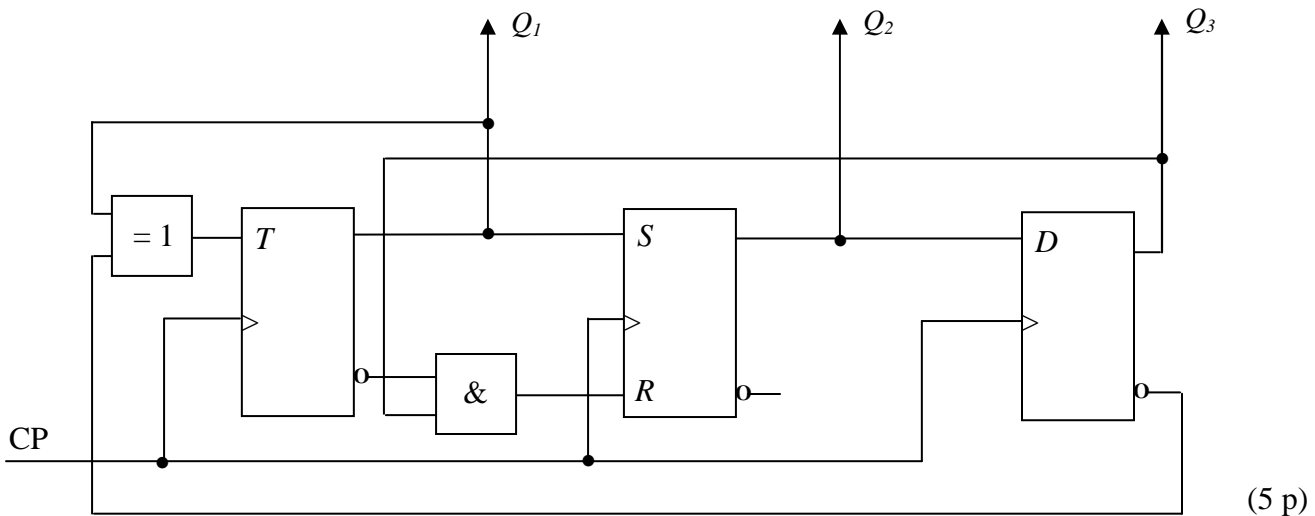
|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |

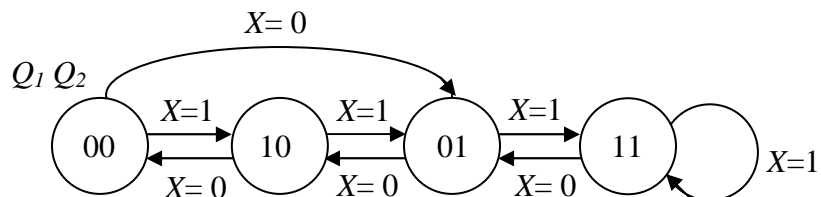
**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.

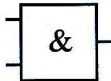
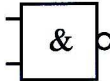
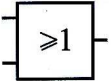
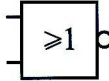
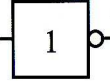
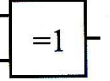
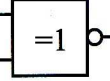


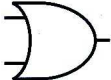
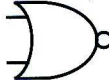
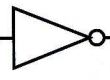
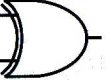
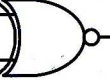


2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

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|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

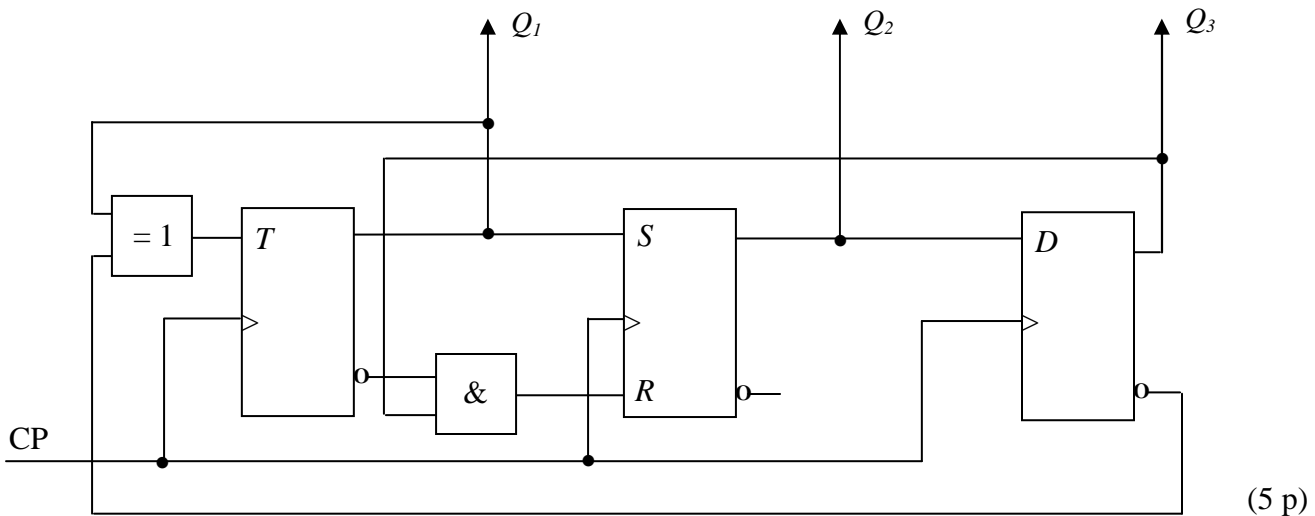
|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |



**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

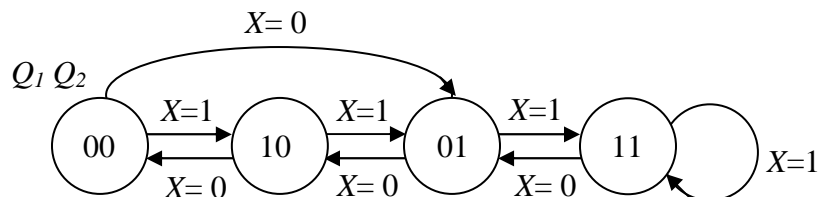
För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.



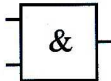
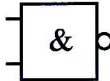
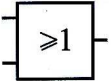
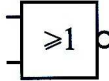
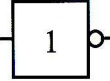
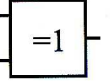
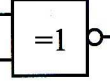


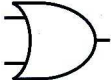
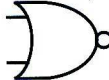
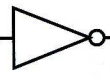
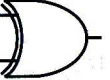
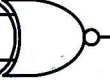
(5 p)

2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

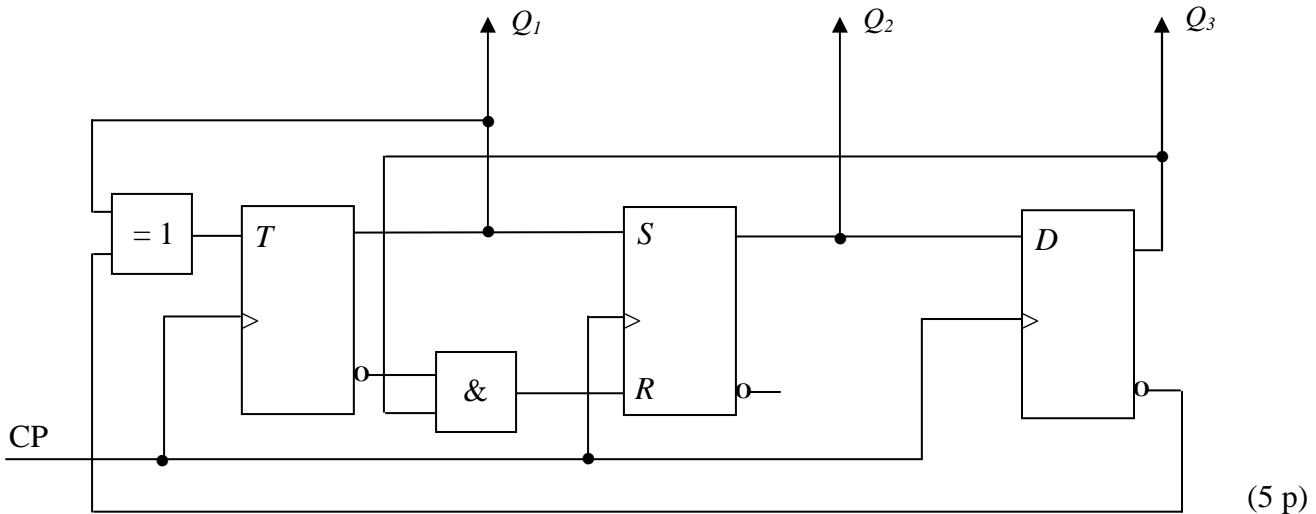
|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
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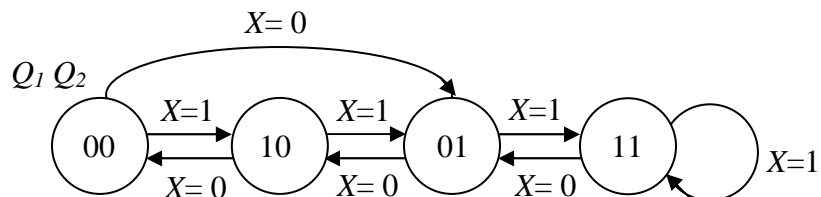
**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.

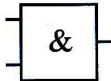
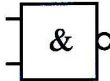
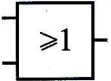
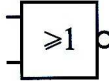
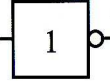
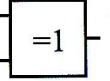
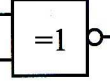


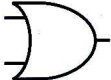
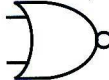
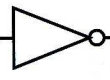
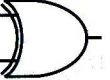
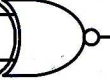


2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

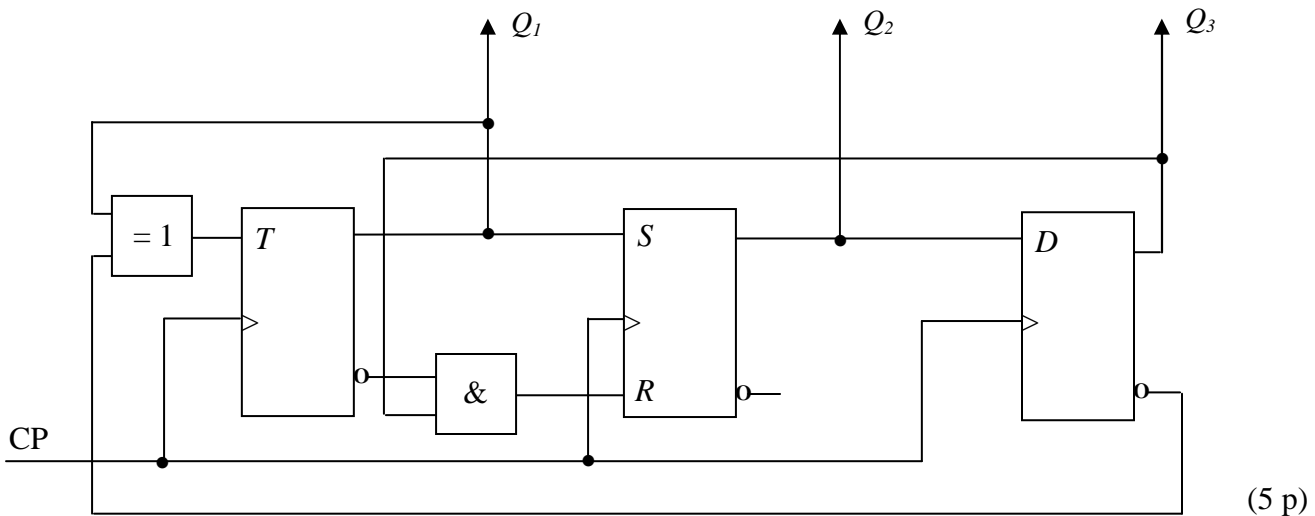
|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
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**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

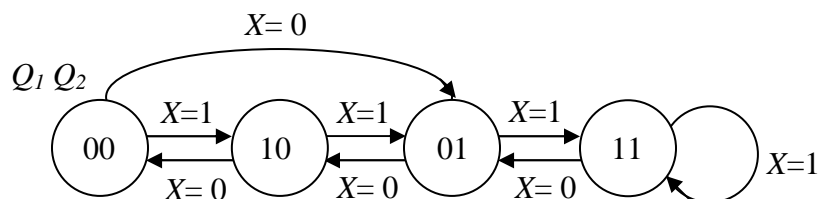
För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.



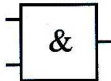
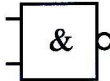
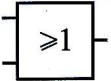
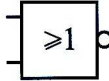
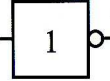
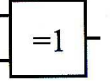
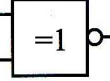


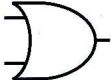
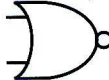
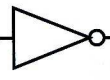
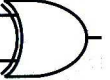
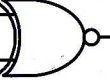
(5 p)

2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

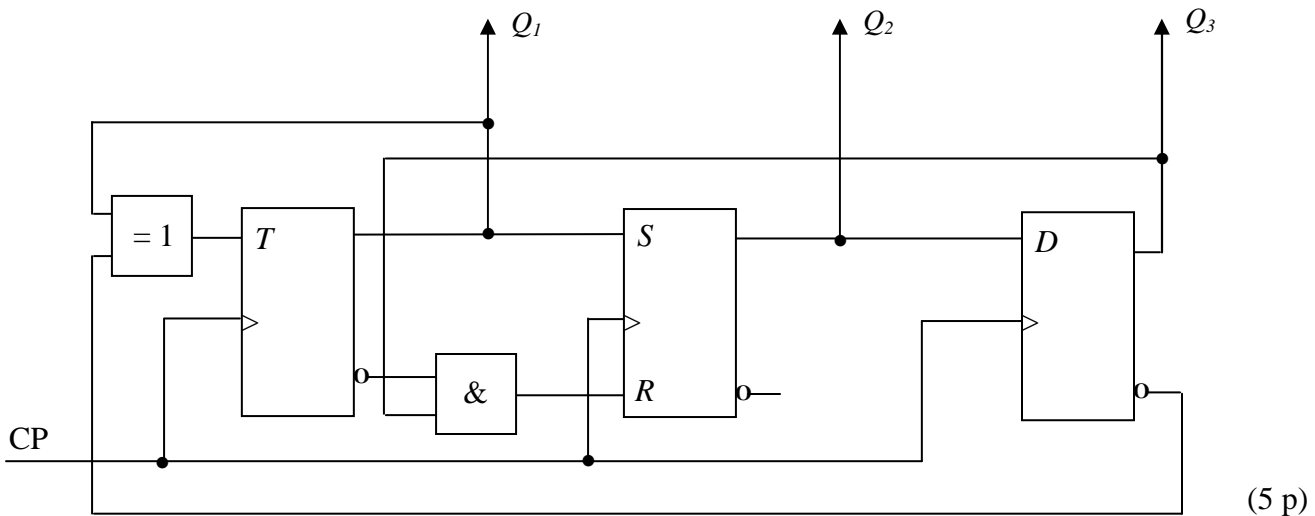
|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
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| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |

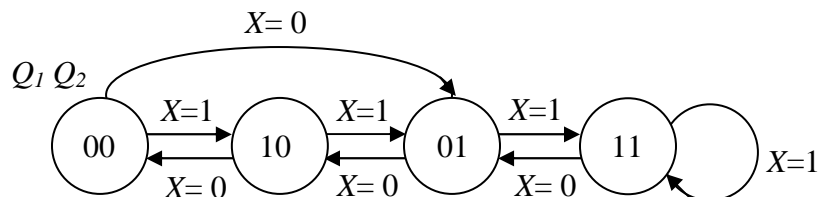
**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.

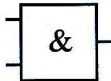
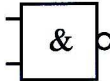
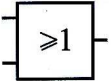
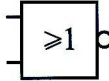
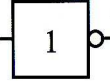
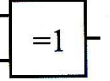
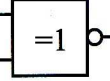


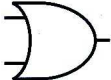
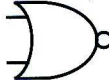
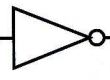
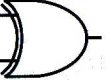
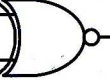


2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

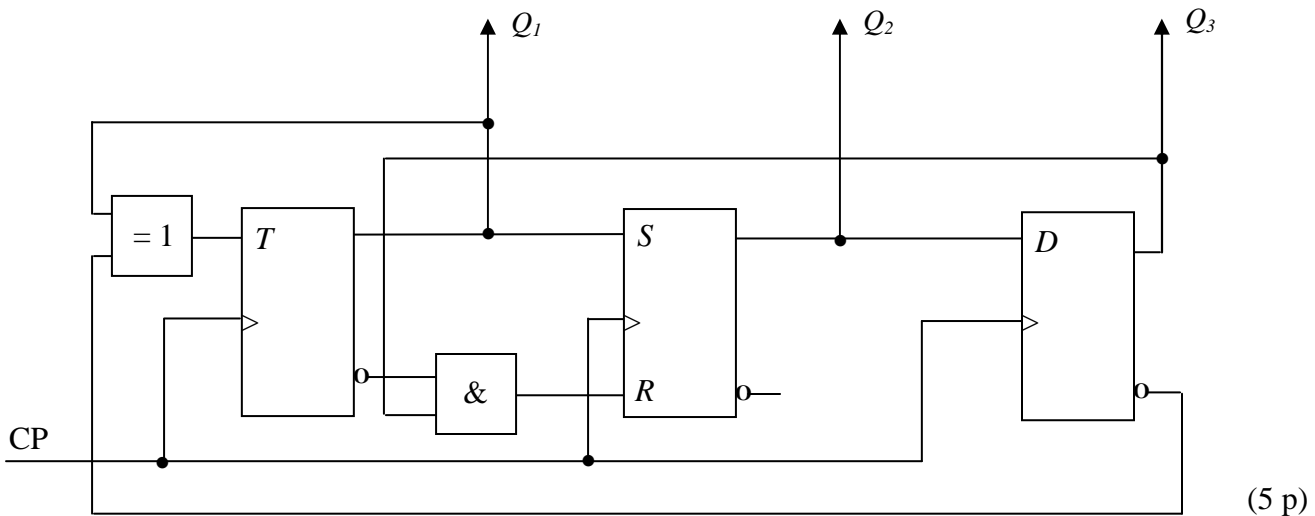
|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |



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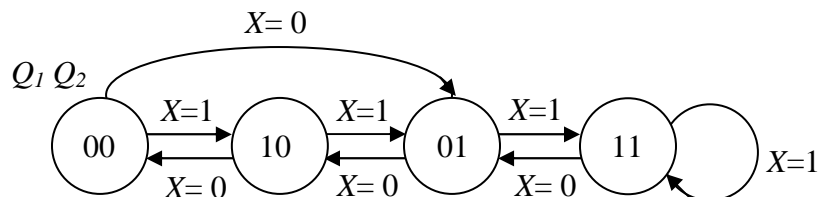
För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.



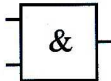
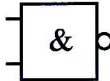
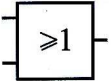
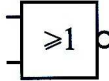
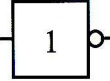
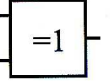
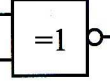


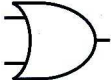
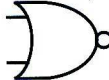
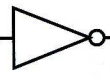
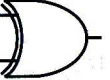
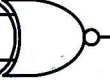
(5 p)

2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

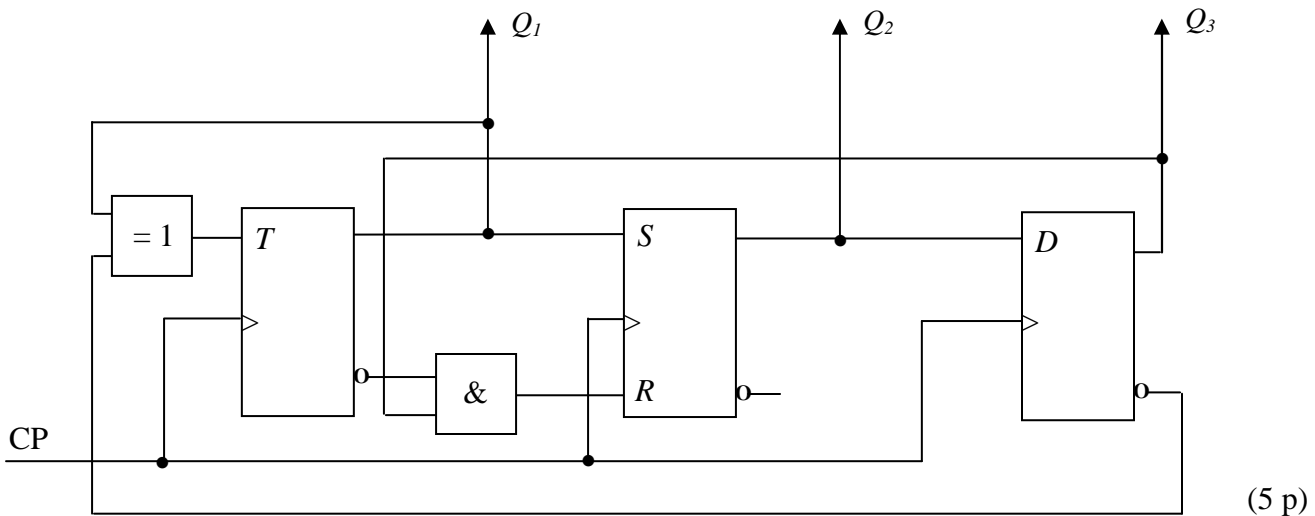
|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |

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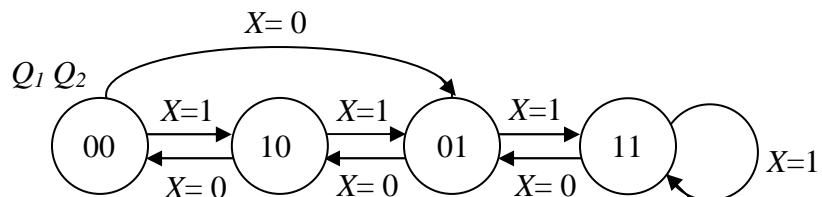
För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.



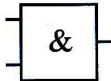
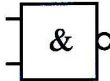
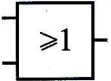
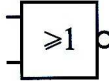
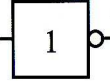
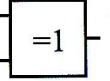
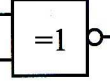


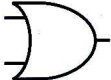
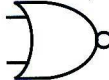
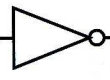
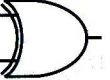
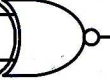
(5 p)

2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

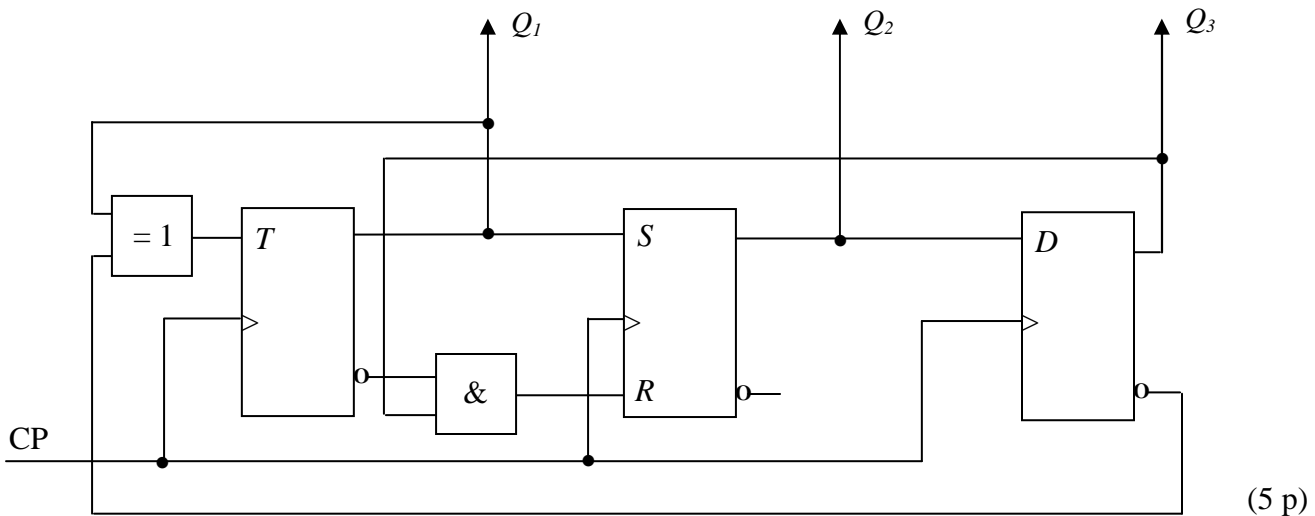
|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |

**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

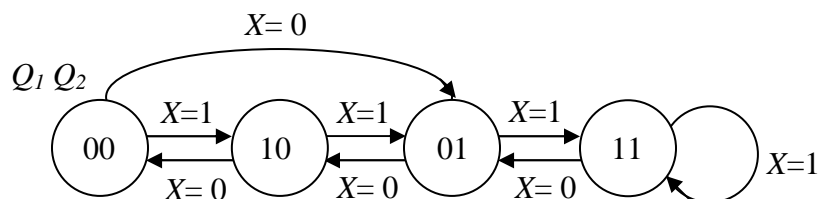
För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.



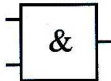
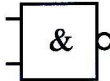
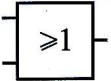
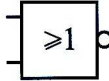
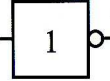
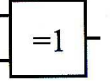
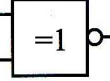


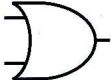
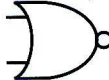
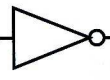
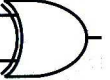
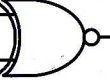
(5 p)

2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

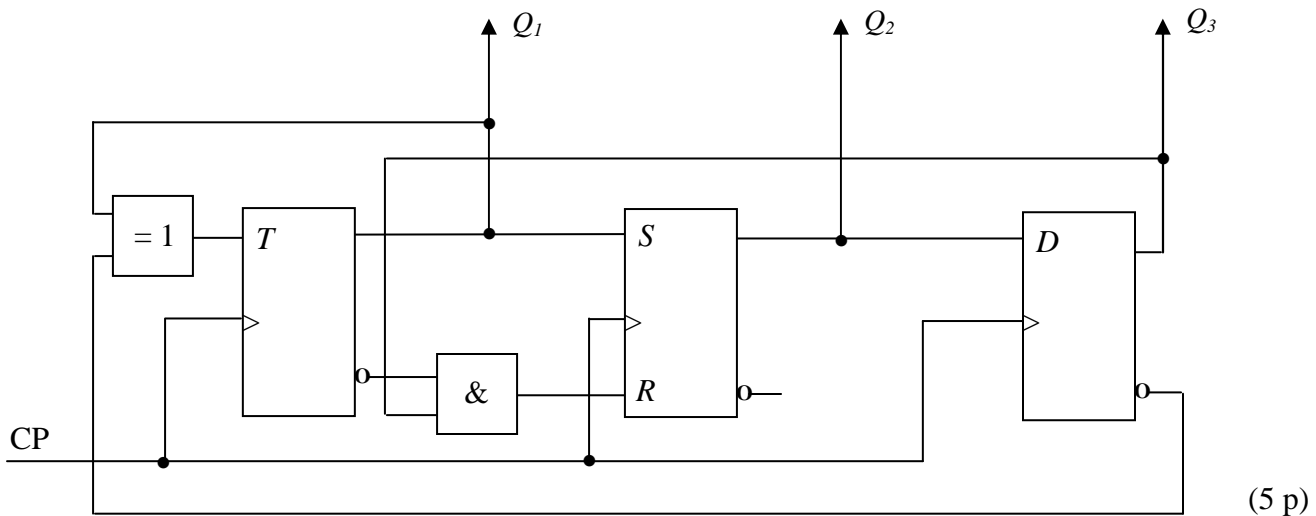
|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
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| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |

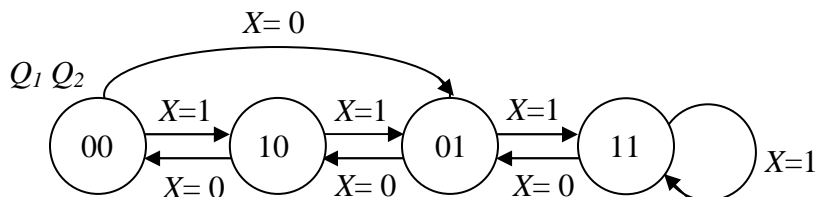
**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.

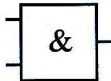
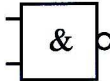
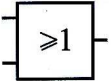
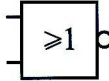
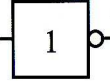
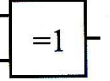
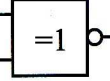


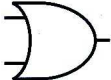
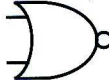
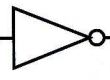
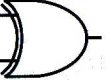
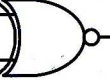


2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

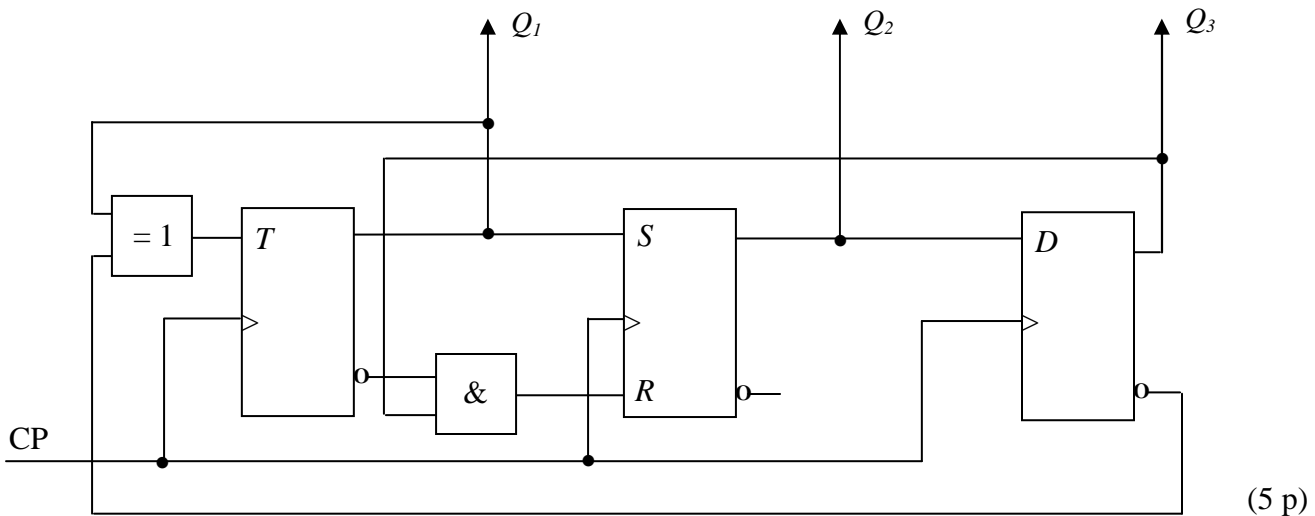
|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
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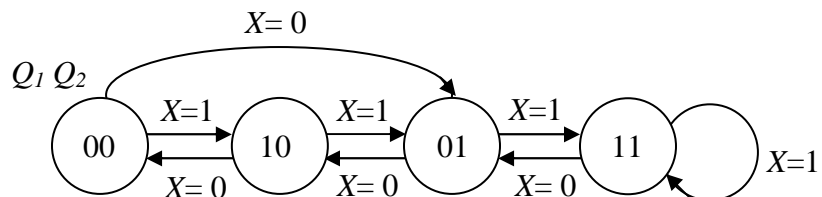
**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

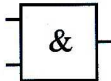
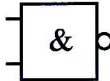
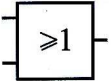
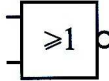
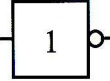
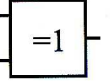
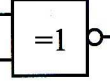


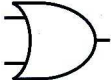
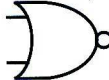
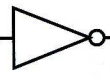
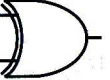
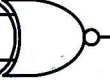
1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.



2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

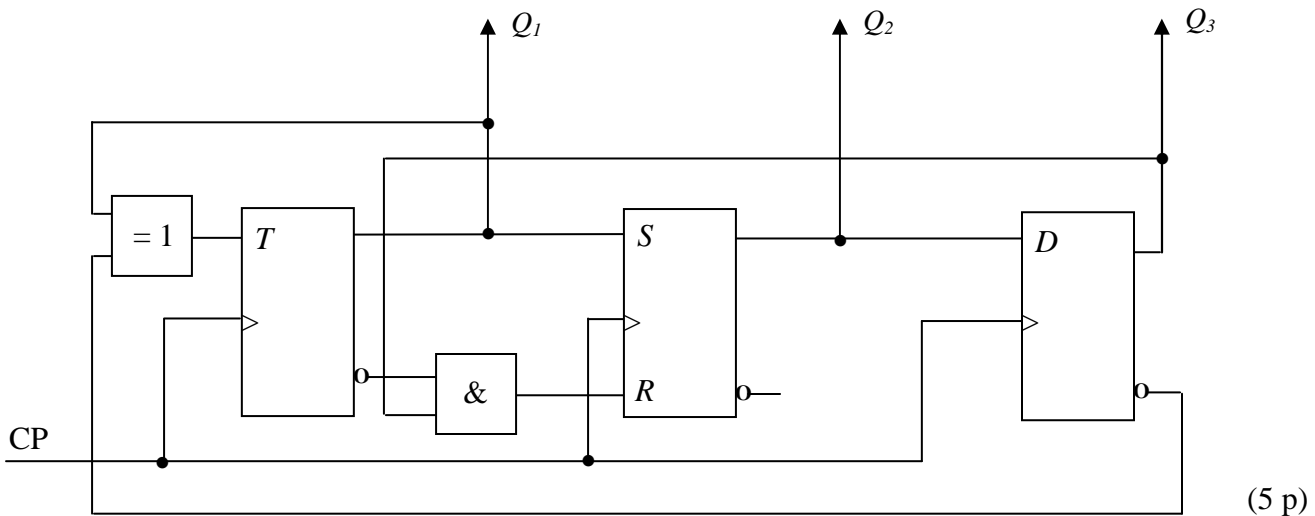
|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |

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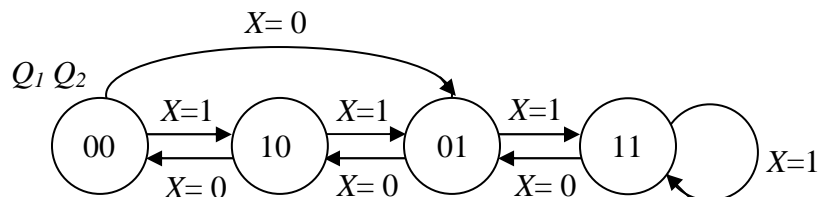
För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.



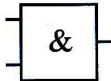
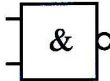
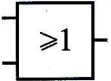
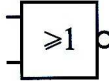
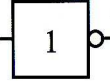
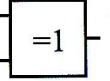
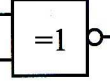


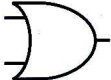
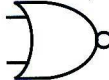
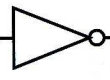
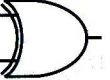
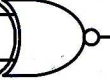
(5 p)

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(5 p)

### Tabeller över grindar

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|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

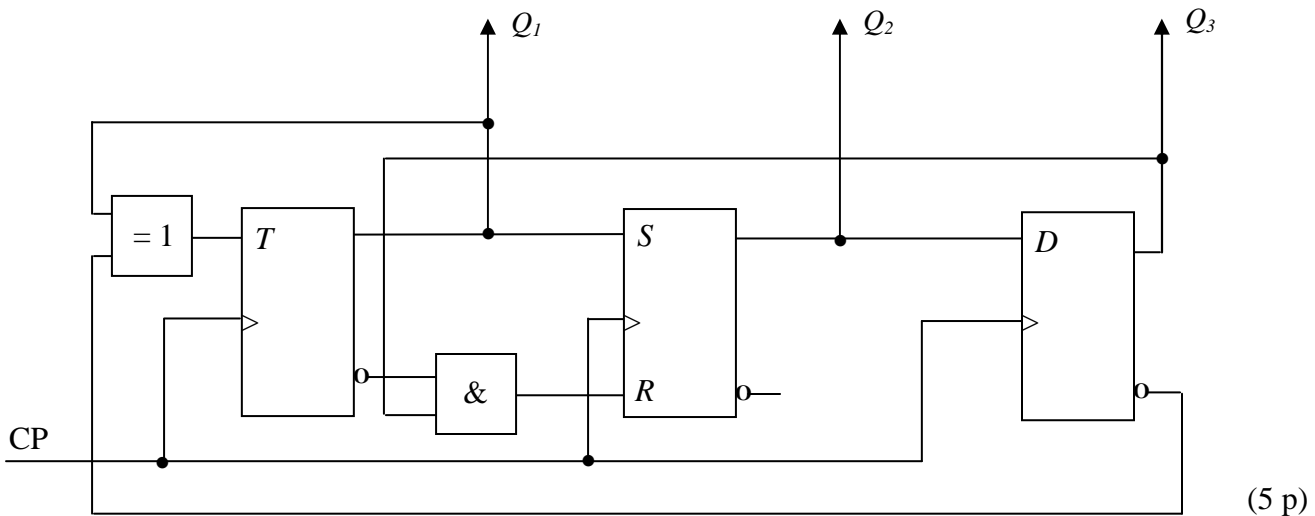
|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
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**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

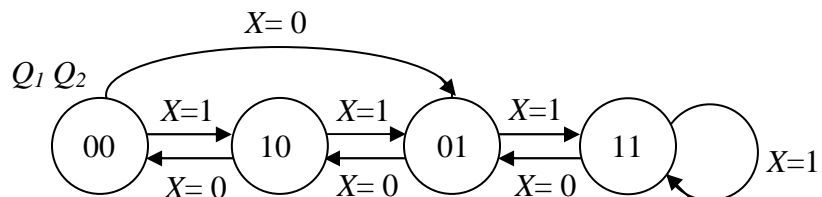
För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.



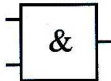
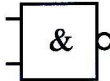
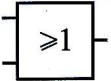
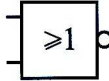
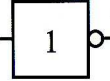
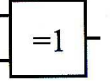
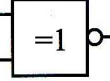


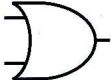
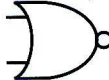
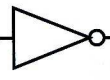
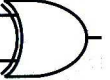
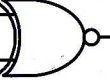
(5 p)

2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

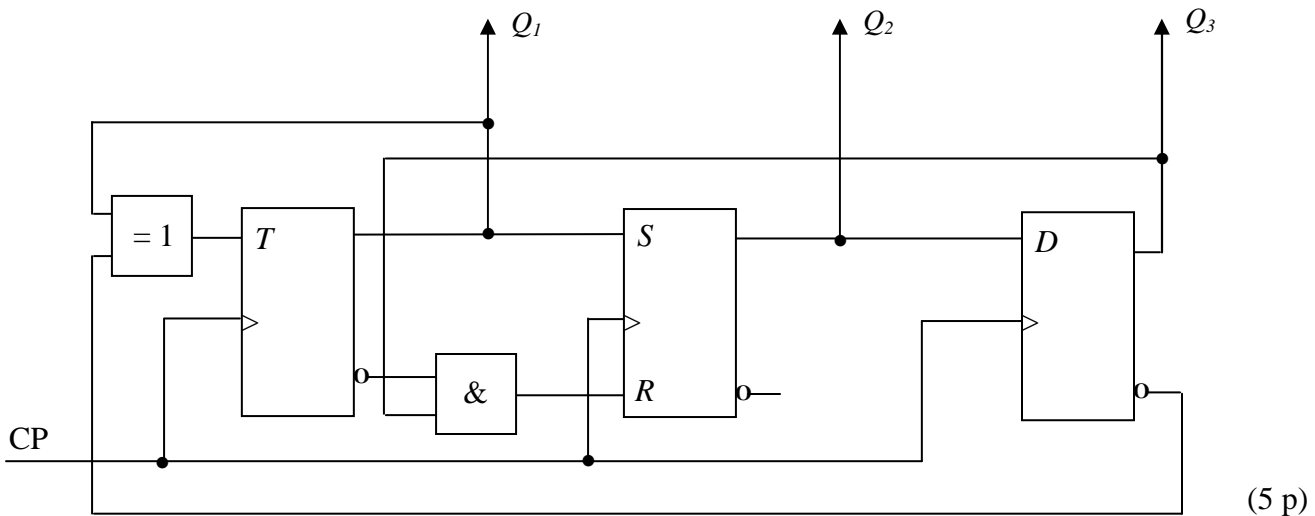
|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
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**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

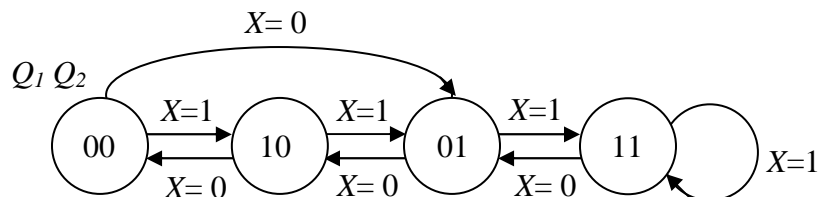
För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.



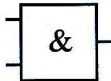
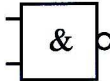
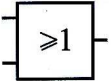
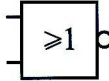
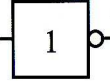
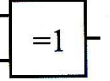
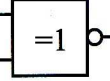


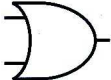
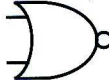
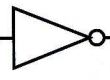
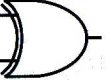
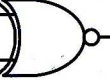
(5 p)

2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

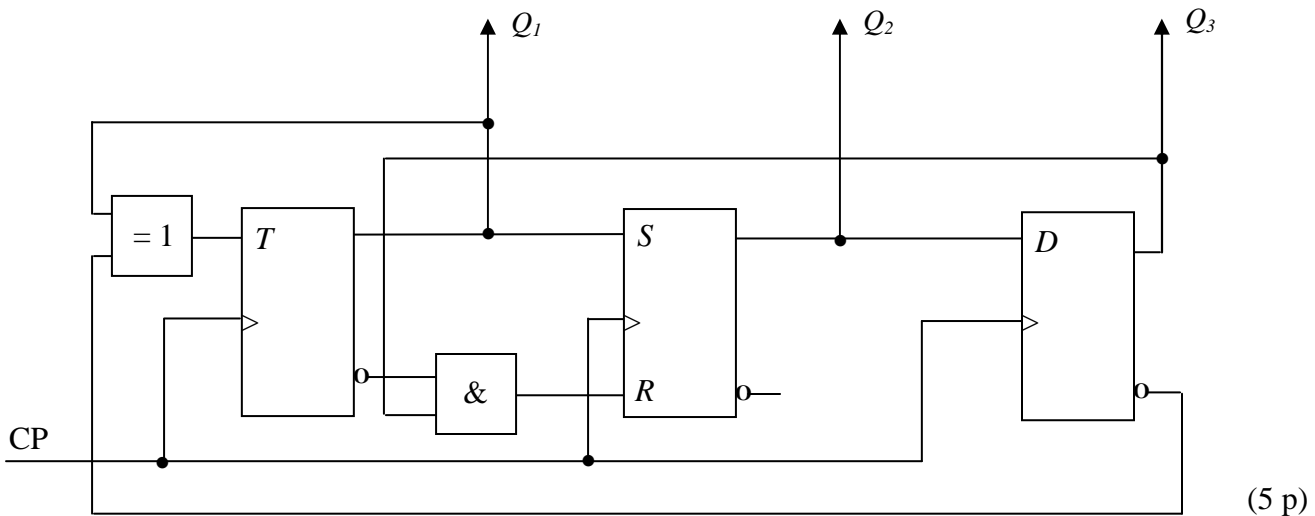
|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
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| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
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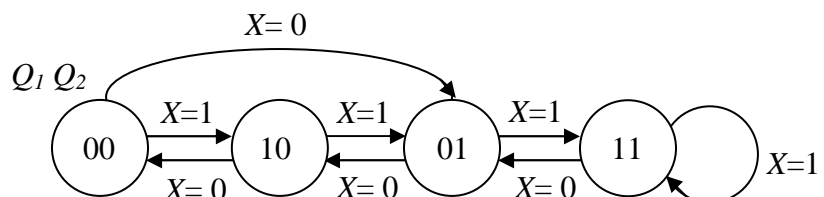
TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.

För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.

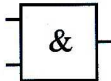
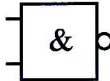
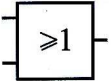
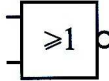
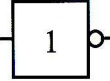
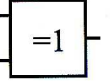
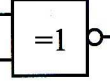


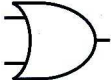
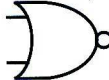
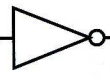
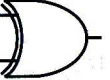
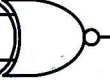


2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafen nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

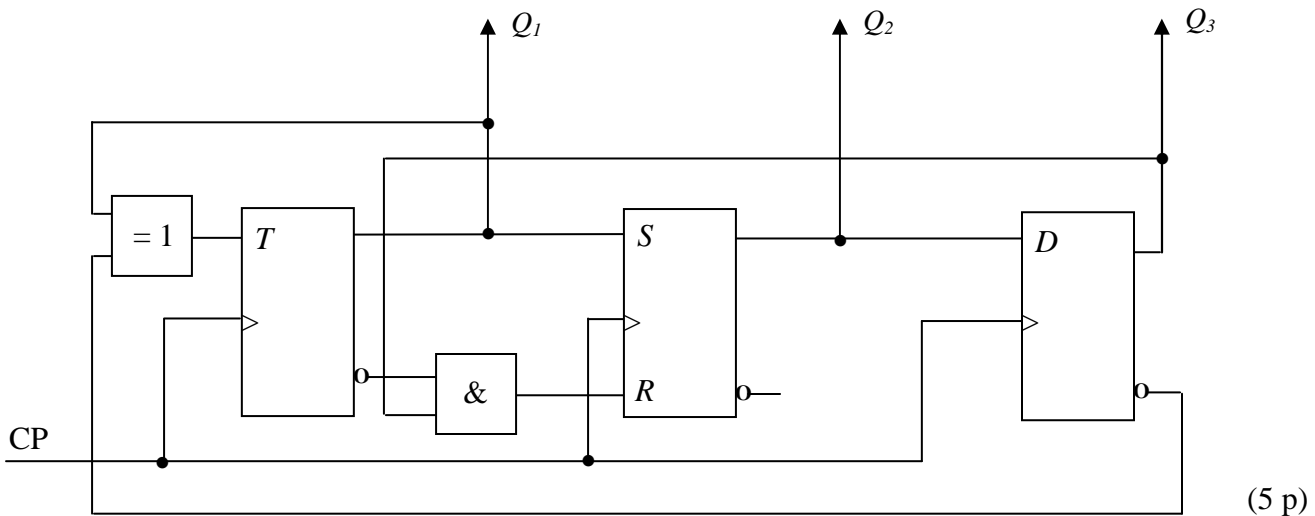
|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
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| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |

**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

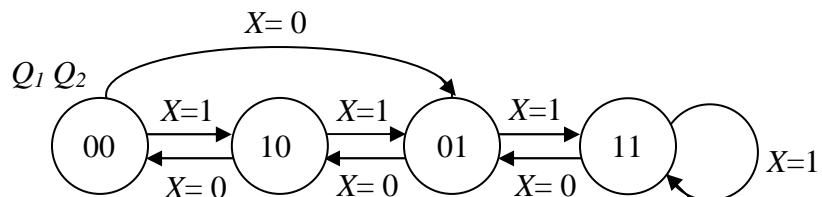
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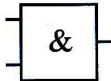
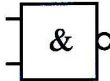
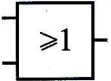
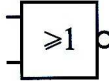
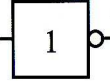
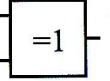
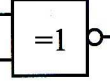


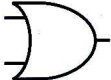
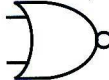
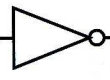
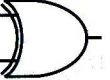
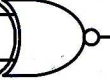
(5 p)

2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



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### Tabeller över grindar

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|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

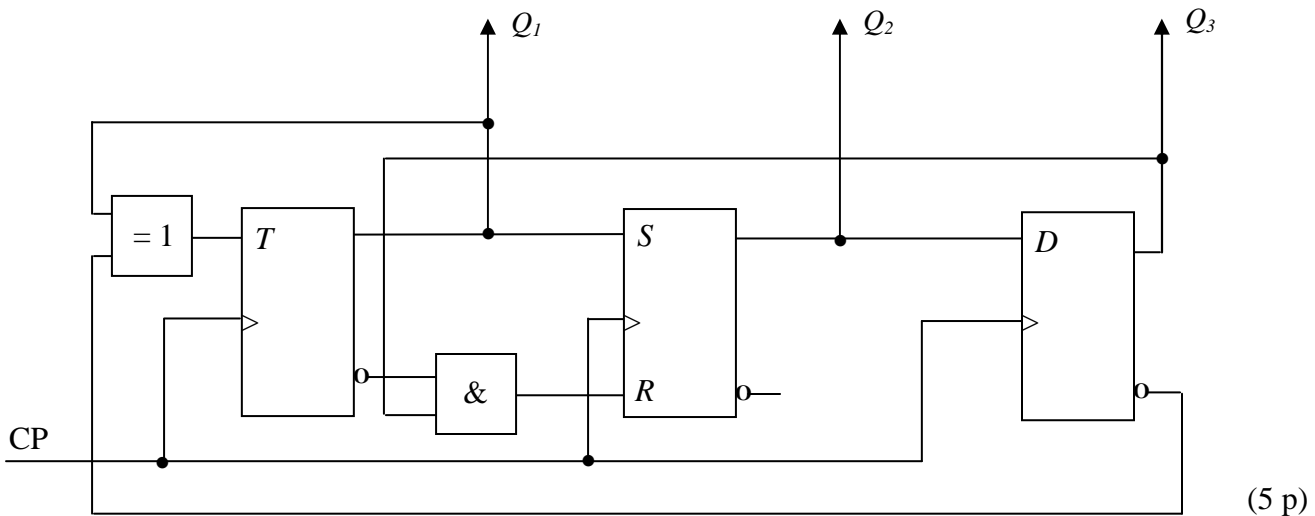
|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
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**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

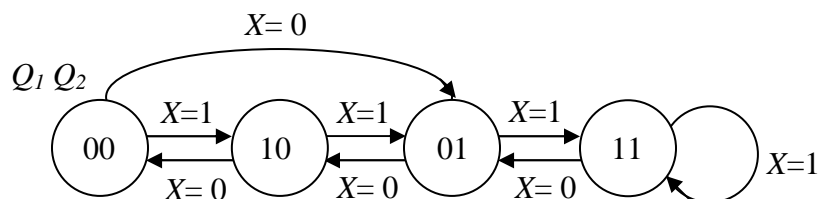
För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.



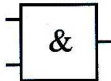
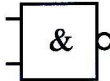
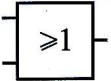
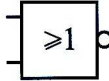
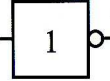
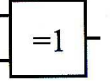
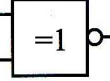


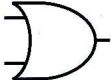
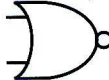
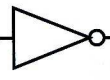
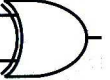
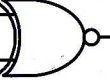
(5 p)

2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

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|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

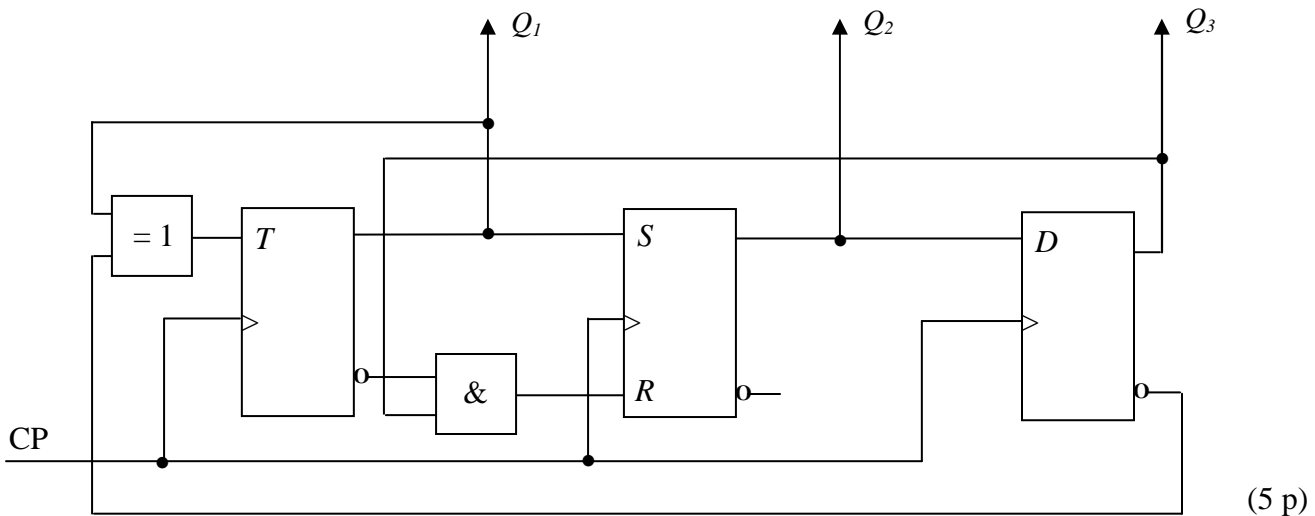
| S            | R            | Q     | J | K | Q                | D | Q | T | Q                |
|--------------|--------------|-------|---|---|------------------|---|---|---|------------------|
| 0            | 0            | $Q_0$ | 0 | 0 | $Q_0$            | 0 | 0 | 0 | $Q_0$            |
| 0            | 1            | 0     | 0 | 1 | 0                | 1 | 1 | 1 | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1 | 0 | 1                |   |   |   |                  |
| <del>1</del> | <del>1</del> |       | 1 | 1 | $\overline{Q_0}$ |   |   |   |                  |

| Q | S | R | J | K | D | T | Q <sup>+</sup> |
|---|---|---|---|---|---|---|----------------|
| 0 | 0 | - | 0 | - | 0 | 0 | 0              |
| 0 | 1 | 0 | 1 | - | 1 | 1 | 1              |
| 1 | 0 | 1 | - | 1 | 0 | 1 | 0              |
| 1 | - | 0 | - | 0 | 1 | 0 | 1              |

**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

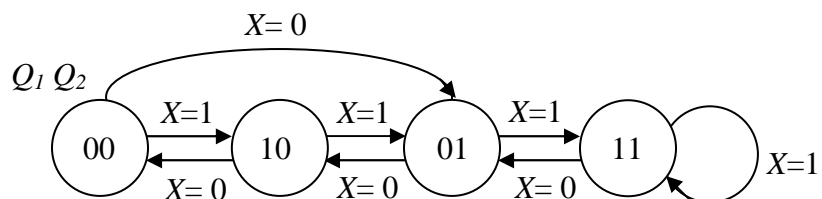
För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.



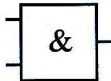
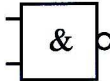
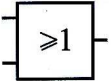
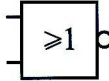
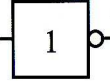
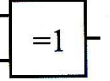
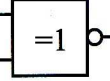


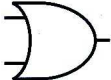
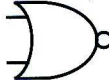
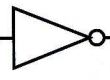
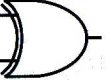
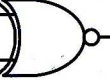
(5 p)

2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

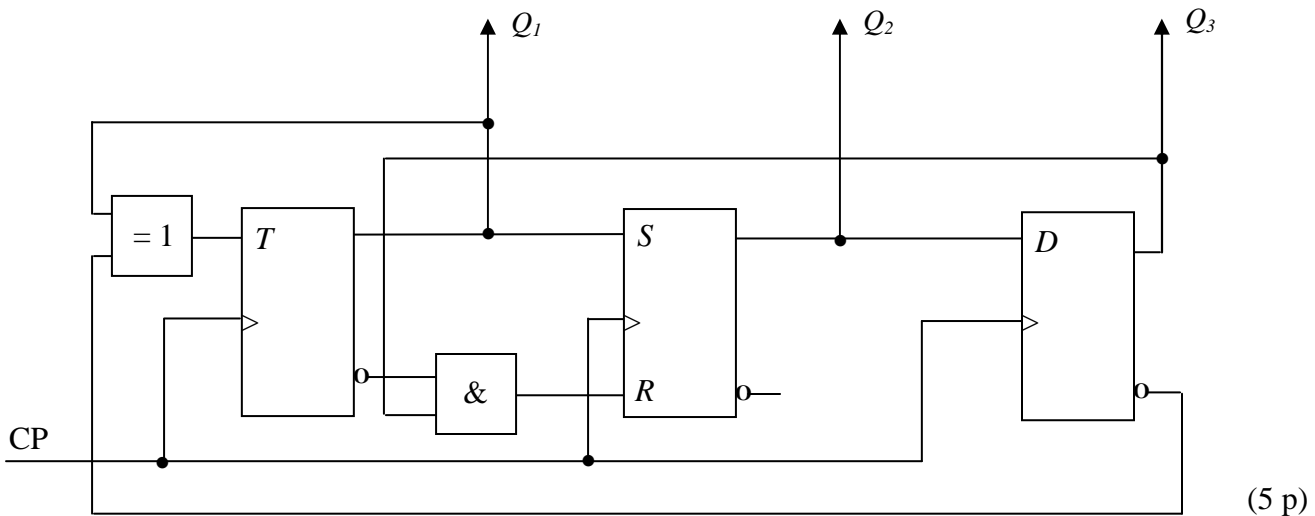
|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |



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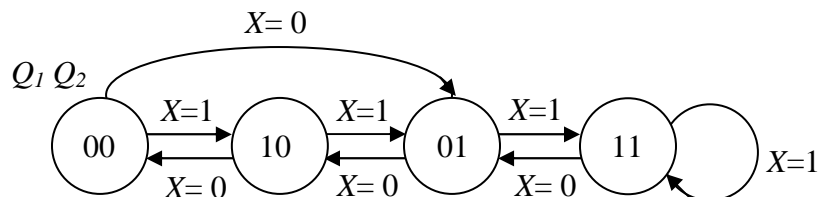
För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.



(5 p)

2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$ | $\overline{A \cdot B}$ | $A + B$ | $\overline{A + B}$ | $\overline{A}$ | $A \oplus B$ | $\overline{A \oplus B}$ |
|-----|---|-------------|------------------------|---------|--------------------|----------------|--------------|-------------------------|
| A   | B | AND         | NAND                   | OR      | NOR                | INVERS         | XOR          | XNOR                    |
| 0   | 0 | 0           | 1                      | 0       | 1                  |                | 0            | 1                       |
| 0   | 1 | 0           | 1                      | 1       | 0                  | 1              | 1            | 0                       |
| 1   | 0 | 0           | 1                      | 1       | 0                  | 0              | 1            | 0                       |
| 1   | 1 | 1           | 0                      | 1       | 0                  |                | 0            | 1                       |
| IEC |   |             |                        |         |                    |                |              |                         |
| USA |   |             |                        |         |                    |                |              |                         |

### Tabeller över vippor

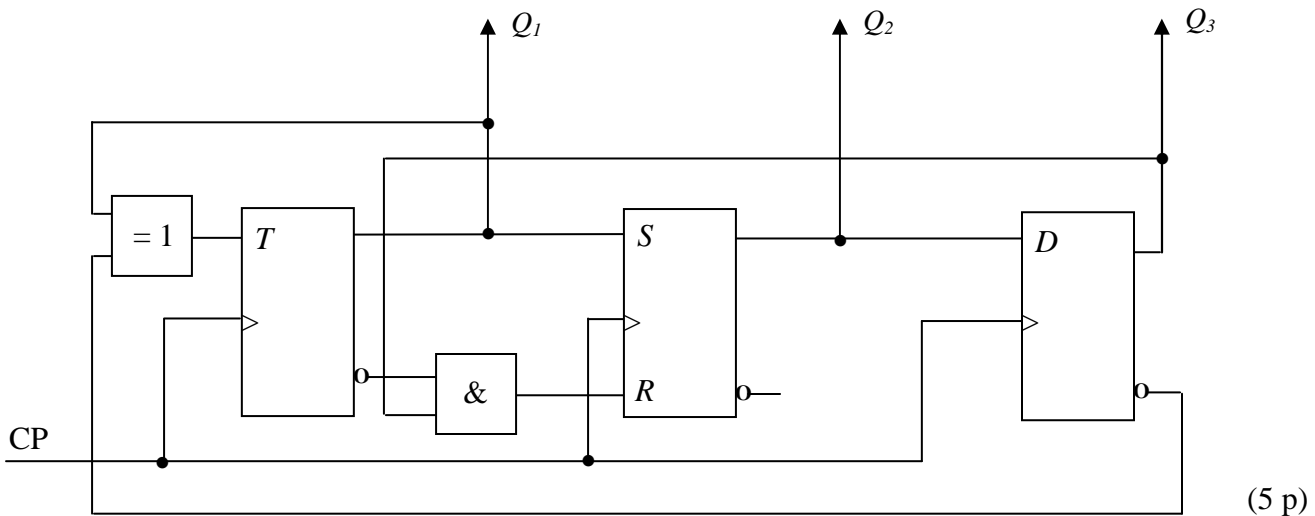
| S            | R            | Q     | J | K | Q                | D | Q | T | Q                |
|--------------|--------------|-------|---|---|------------------|---|---|---|------------------|
| 0            | 0            | $Q_0$ | 0 | 0 | $Q_0$            | 0 | 0 | 0 | $Q_0$            |
| 0            | 1            | 0     | 0 | 1 | 0                | 1 | 1 | 1 | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1 | 0 | 1                |   |   |   |                  |
| <del>1</del> | <del>1</del> |       | 1 | 1 | $\overline{Q_0}$ |   |   |   |                  |

| Q | S | R | J | K | D | T | Q <sup>+</sup> |
|---|---|---|---|---|---|---|----------------|
| 0 | 0 | - | 0 | - | 0 | 0 | 0              |
| 0 | 1 | 0 | 1 | - | 1 | 1 | 1              |
| 1 | 0 | 1 | - | 1 | 0 | 1 | 0              |
| 1 | - | 0 | - | 0 | 1 | 0 | 1              |

**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

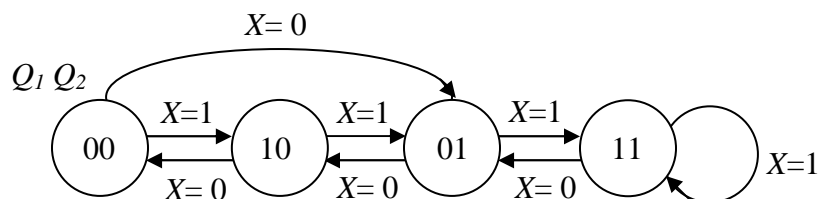
För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.



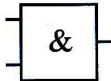
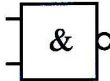
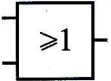
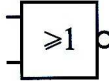
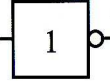
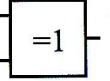
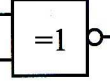


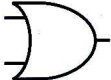
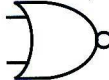
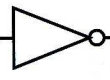
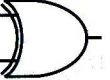
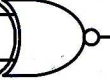
(5 p)

2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

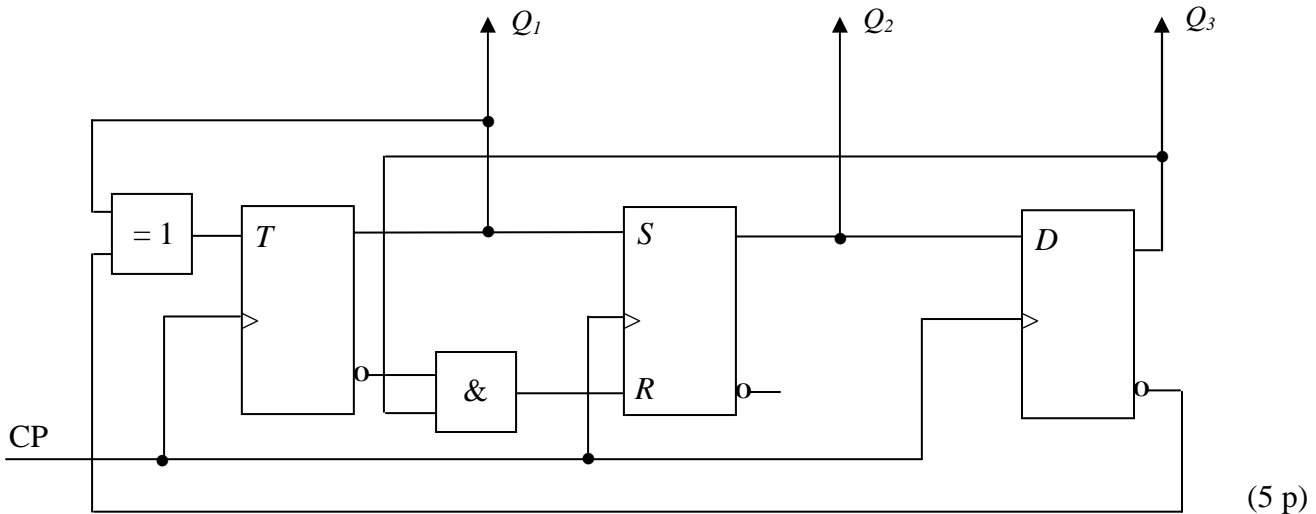
|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |

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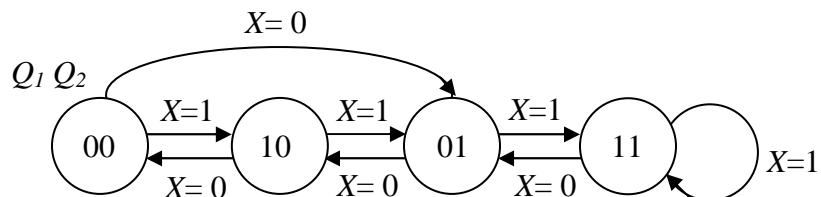
För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.



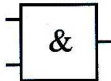
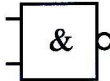
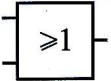
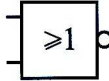
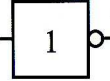
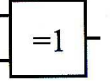
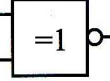


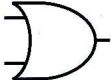
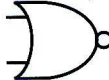
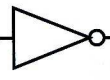
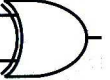
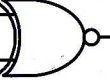
(5 p)

2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafen nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

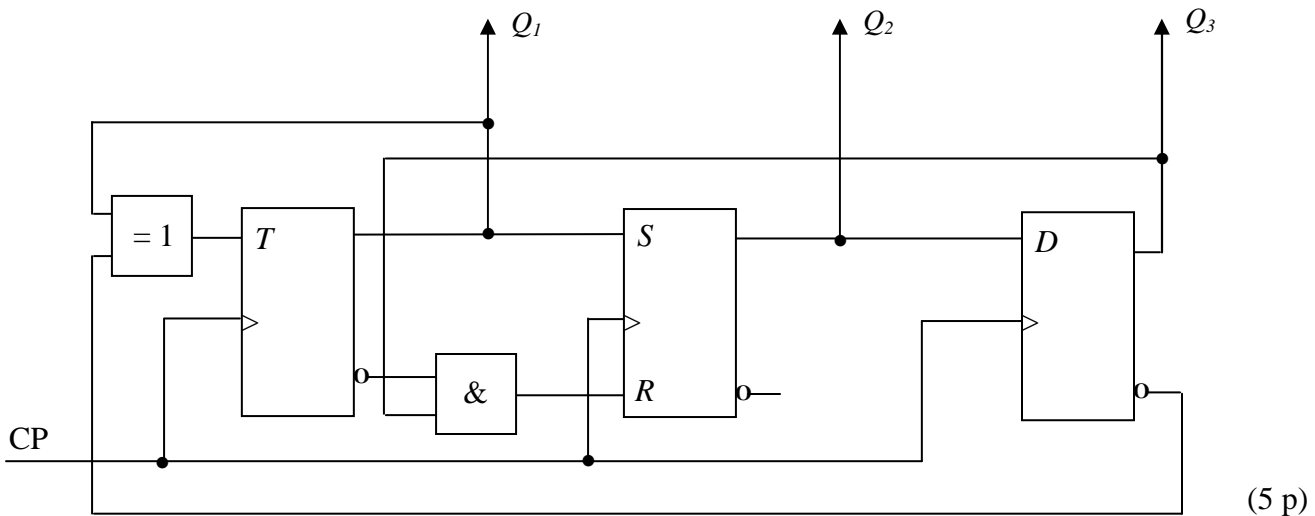
|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |

**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

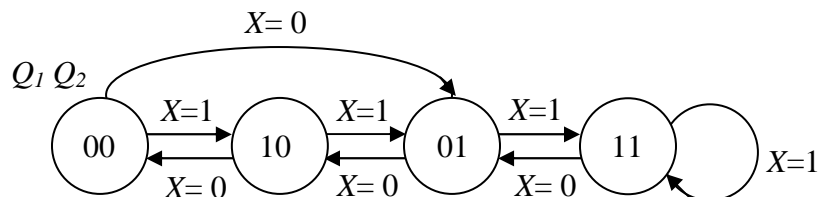
För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.



(5 p)

2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$ | $\overline{A \cdot B}$ | $A + B$ | $\overline{A + B}$ | $\overline{A}$ | $A \oplus B$ | $\overline{A \oplus B}$ |
|-----|---|-------------|------------------------|---------|--------------------|----------------|--------------|-------------------------|
| A   | B | AND         | NAND                   | OR      | NOR                | INVERS         | XOR          | XNOR                    |
| 0   | 0 | 0           | 1                      | 0       | 1                  |                | 0            | 1                       |
| 0   | 1 | 0           | 1                      | 1       | 0                  | 1              | 1            | 0                       |
| 1   | 0 | 0           | 1                      | 1       | 0                  | 0              | 1            | 0                       |
| 1   | 1 | 1           | 0                      | 1       | 0                  |                | 0            | 1                       |
| IEC |   |             |                        |         |                    |                |              |                         |
| USA |   |             |                        |         |                    |                |              |                         |

### Tabeller över vippor

| S            | R            | Q     | J | K | Q                | D | Q | T | Q                |
|--------------|--------------|-------|---|---|------------------|---|---|---|------------------|
| 0            | 0            | $Q_0$ | 0 | 0 | $Q_0$            | 0 | 0 | 0 | $Q_0$            |
| 0            | 1            | 0     | 0 | 1 | 0                | 1 | 1 | 1 | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1 | 0 | 1                |   |   |   |                  |
| <del>1</del> | <del>1</del> |       | 1 | 1 | $\overline{Q_0}$ |   |   |   |                  |

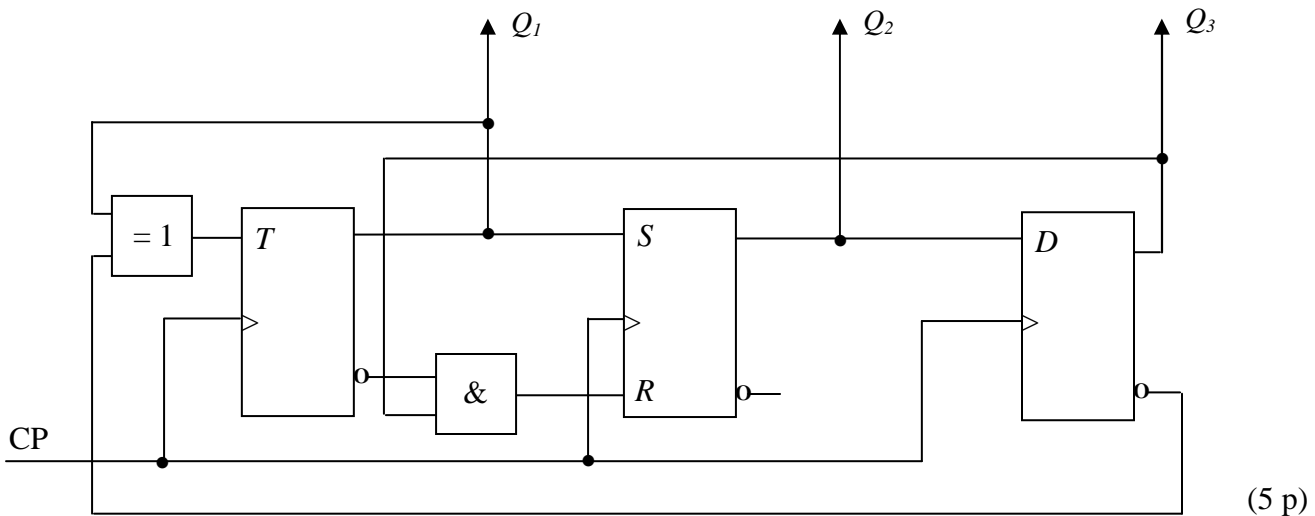
| Q | S | R | J | K | D | T | Q <sup>+</sup> |
|---|---|---|---|---|---|---|----------------|
| 0 | 0 | - | 0 | - | 0 | 0 | 0              |
| 0 | 1 | 0 | 1 | - | 1 | 1 | 1              |
| 1 | 0 | 1 | - | 1 | 0 | 1 | 0              |
| 1 | - | 0 | - | 0 | 1 | 0 | 1              |



**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

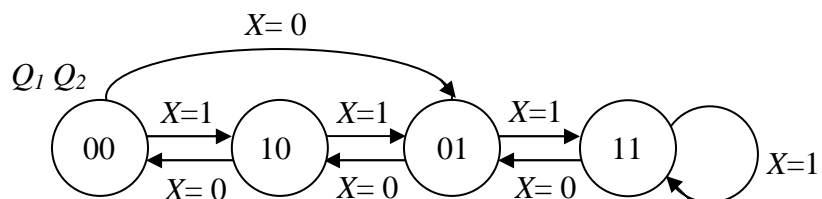
För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.



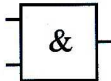
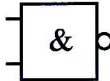
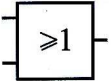
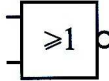
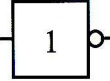
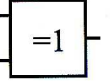
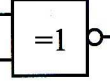


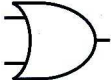
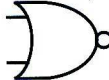
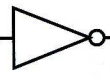
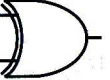
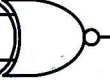
(5 p)

2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

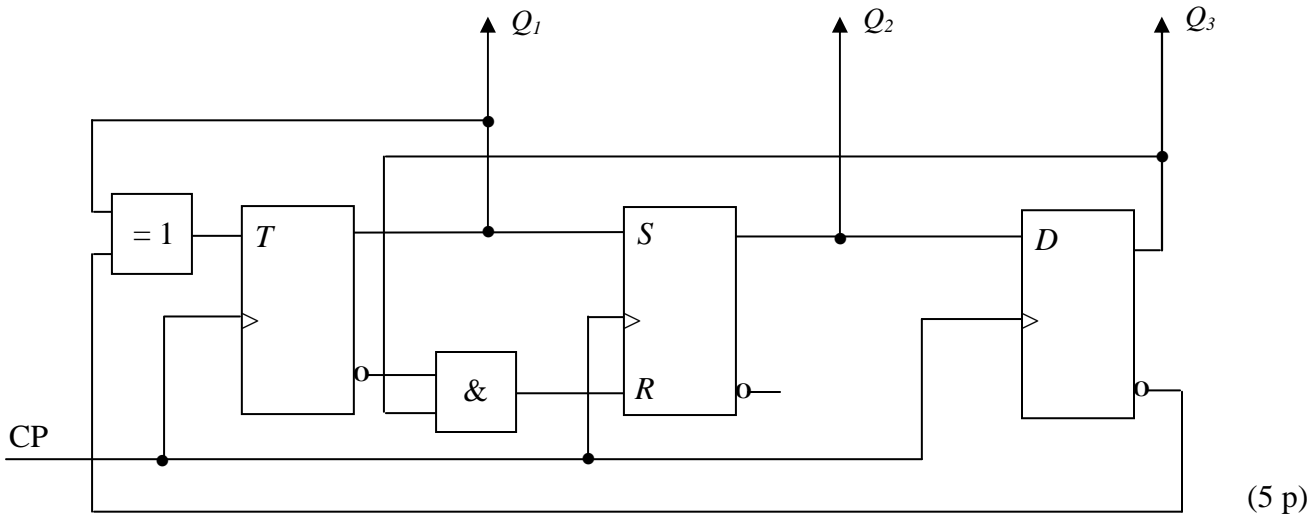
|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |

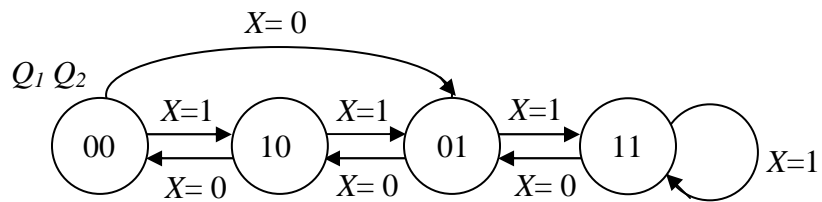
**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.

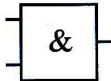
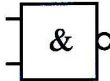
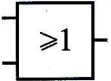
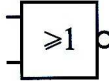
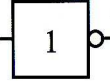
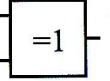
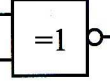


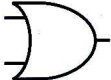
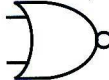
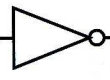
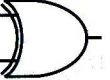
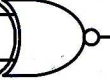


2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

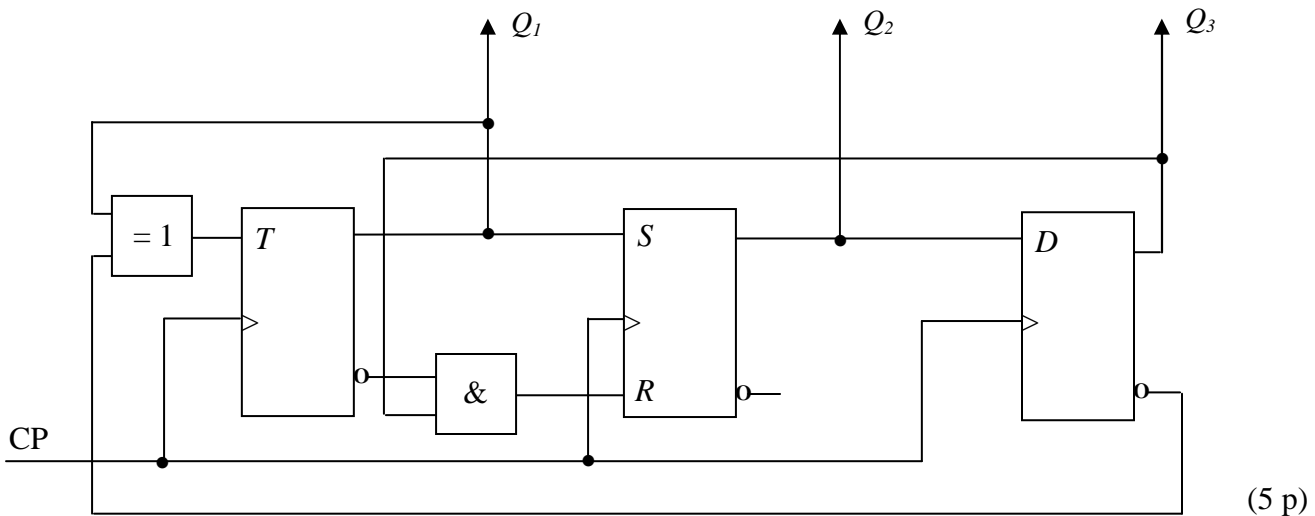
|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |

**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

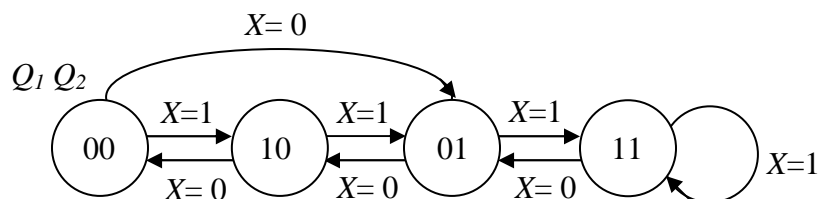
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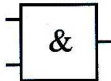
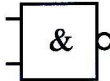
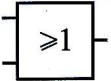
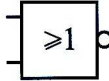
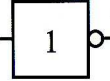
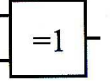
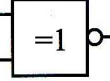


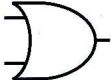
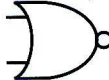
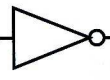
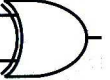
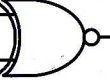
(5 p)

2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

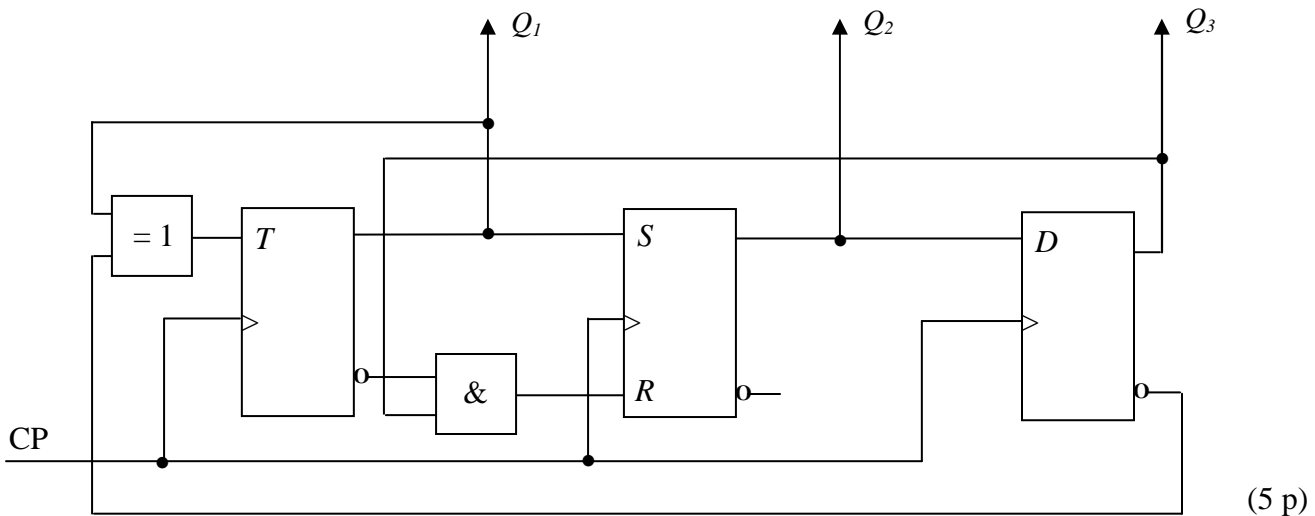
|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |

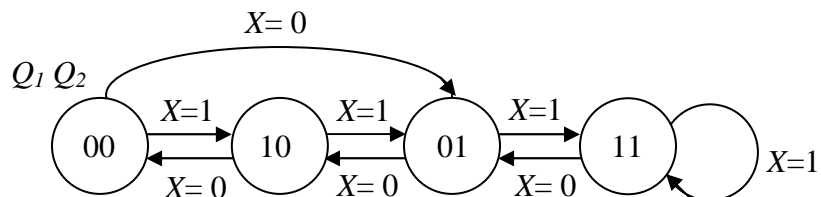
**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.

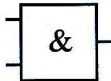
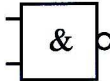
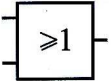
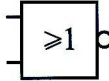
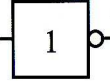
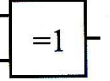
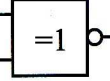


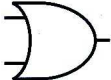
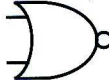
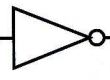
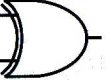
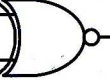


2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

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|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

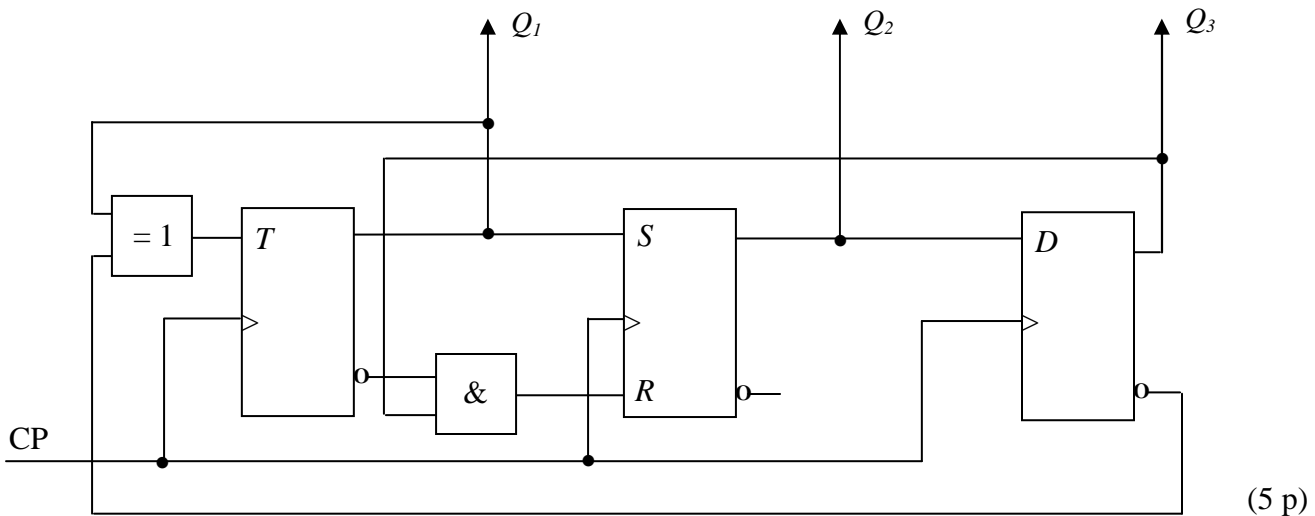
|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |



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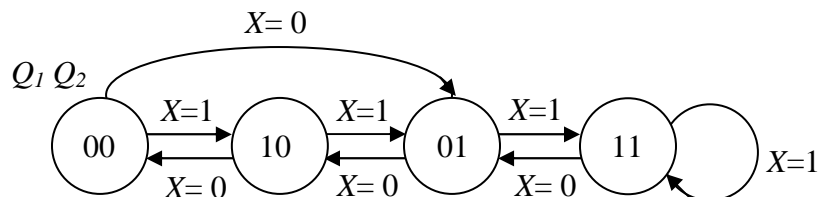
För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.



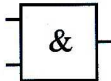
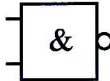
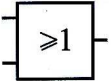
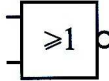
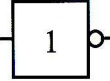
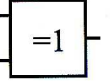
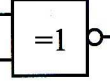


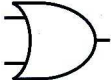
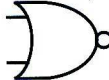
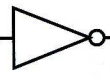
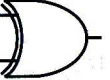
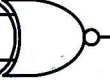
(5 p)

2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

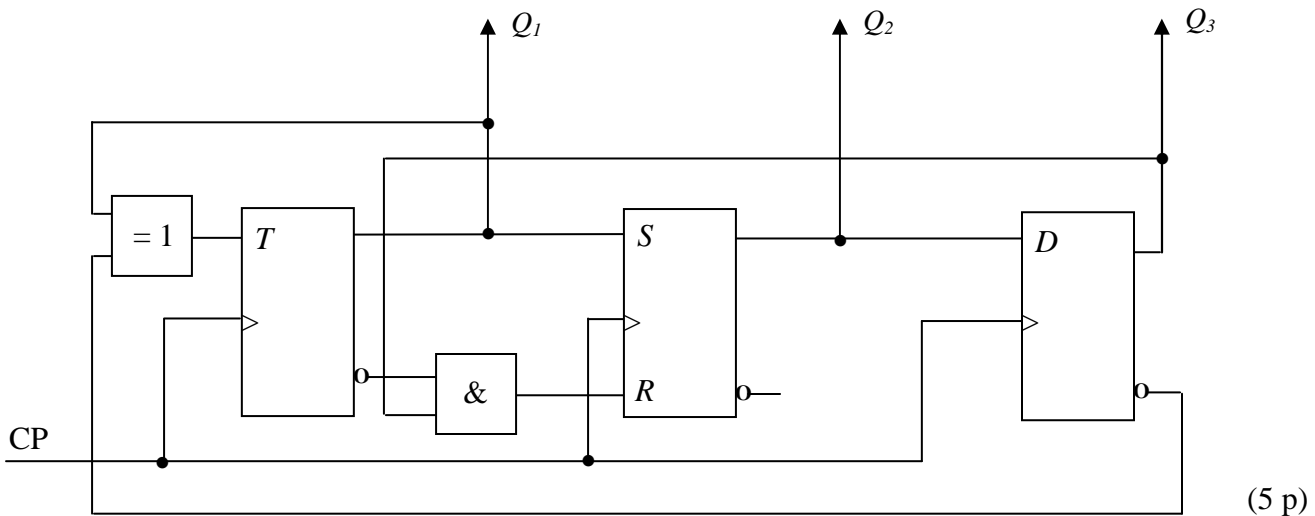
|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |

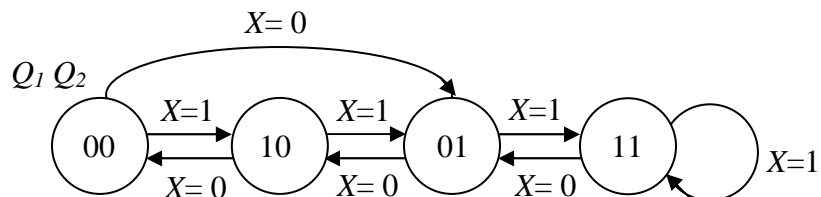
**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.

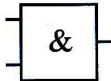
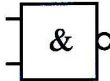
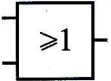
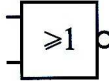
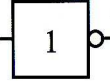
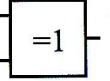
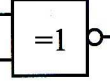


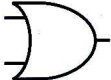
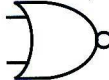
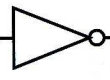
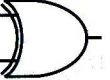
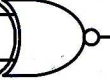


2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

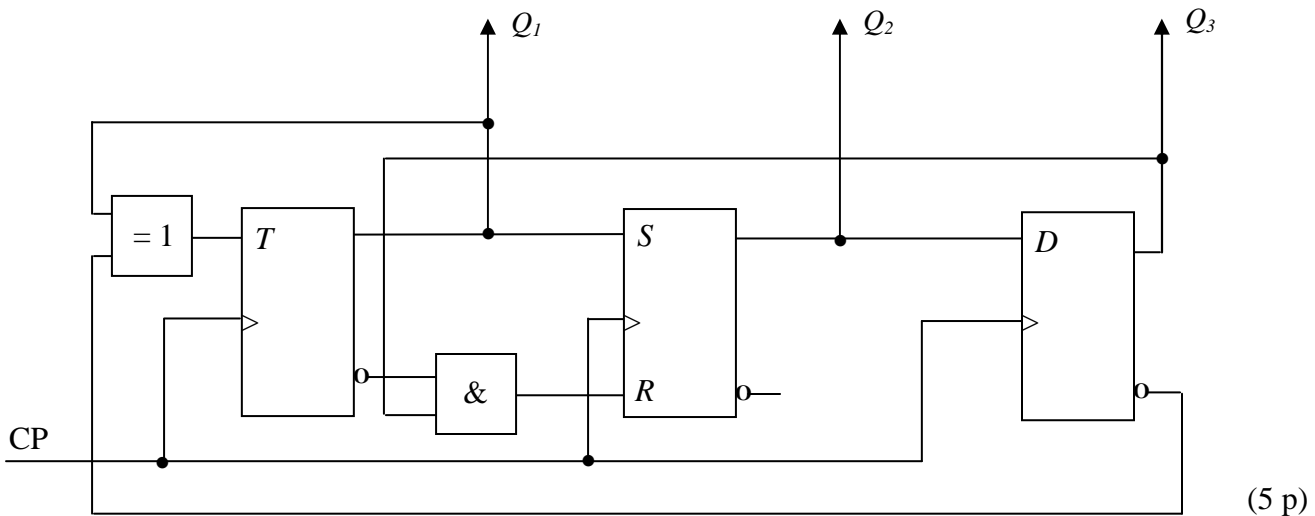
|              |              |       |     |     |                  |     |     |     |                  |
|--------------|--------------|-------|-----|-----|------------------|-----|-----|-----|------------------|
| $S$          | $R$          | $Q$   | $J$ | $K$ | $Q$              | $D$ | $Q$ | $T$ | $Q$              |
| 0            | 0            | $Q_0$ | 0   | 0   | $Q_0$            | 0   | 0   | 0   | $Q_0$            |
| 0            | 1            | 0     | 0   | 1   | 0                | 1   | 1   | 1   | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1   | 0   | 1                |     |     |     |                  |
| <del>1</del> | <del>1</del> |       | 1   | 1   | $\overline{Q_0}$ |     |     |     |                  |

|     |     |     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-----|-----|-------|
| $Q$ | $S$ | $R$ | $J$ | $K$ | $D$ | $T$ | $Q^+$ |
| 0   | 0   | -   | 0   | -   | 0   | 0   | 0     |
| 0   | 1   | 0   | 1   | -   | 1   | 1   | 1     |
| 1   | 0   | 1   | -   | 1   | 0   | 1   | 0     |
| 1   | -   | 0   | -   | 0   | 1   | 0   | 1     |

**TMEL53 Digitalteknik – Dugga 3 – 20 februari 2015.**

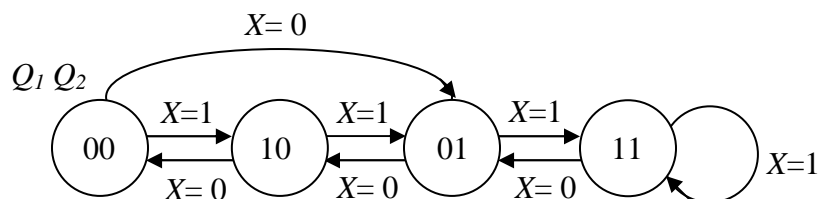
För godkänt på duggan krävs minst 7 poäng av 10 möjliga.

1. Beskriv funktionen hos sekvensnätet nedan genom att rita en tillståndsgraf.



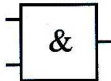
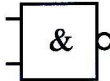
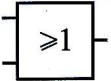
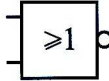
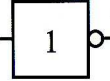
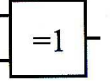
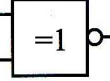


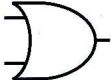
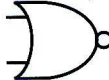
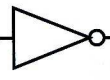
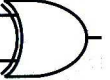
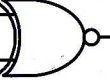
(5 p)

2. Konstruera ett sekvensnät som fungerar enligt tillståndsgrafens nedan. JK-vippor och valfria grindar får användas. För full poäng krävs att konstruktionen är minimal.



(5 p)

### Tabeller över grindar

|     |   | $A \cdot B$   | $\overline{A \cdot B}$  | $A + B$   | $\overline{A + B}$  | $\overline{A}$   | $A \oplus B$  | $\overline{A \oplus B}$   |
|-----|---|---|---|---|---|--|---|---|
| A   | B | AND   | NAND  | OR  | NOR   | INVERS   | XOR   | XNOR  |
| 0   | 0 | 0   | 1   | 0   | 1   |  | 0   | 1   |
| 0   | 1 | 0   | 1   | 1   | 0   | 1  | 1   | 0   |
| 1   | 0 | 0   | 1   | 1   | 0   | 0  | 1   | 0   |
| 1   | 1 | 1   | 0   | 1   | 0   |  | 0   | 1   |
| IEC |   |  |  |  |  |  |  |  |
| USA |   |  |  |  |  |  |  |  |

### Tabeller över vippor

| S            | R            | Q     | J | K | Q                | D | Q | T | Q                |
|--------------|--------------|-------|---|---|------------------|---|---|---|------------------|
| 0            | 0            | $Q_0$ | 0 | 0 | $Q_0$            | 0 | 0 | 0 | $Q_0$            |
| 0            | 1            | 0     | 0 | 1 | 0                | 1 | 1 | 1 | $\overline{Q_0}$ |
| 1            | 0            | 1     | 1 | 0 | 1                |   |   |   |                  |
| <del>1</del> | <del>1</del> |       | 1 | 1 | $\overline{Q_0}$ |   |   |   |                  |

| Q | S | R | J | K | D | T | Q <sup>+</sup> |
|---|---|---|---|---|---|---|----------------|
| 0 | 0 | - | 0 | - | 0 | 0 | 0              |
| 0 | 1 | 0 | 1 | - | 1 | 1 | 1              |
| 1 | 0 | 1 | - | 1 | 0 | 1 | 0              |
| 1 | - | 0 | - | 0 | 1 | 0 | 1              |