# 四川大学平时测验试题（2018~2019 - 1）

课程号：304131030 课序号：7 教学周：16 课程名称：数字逻辑（双语）任课教师：吴志红



**1. Fill in the blanks with the correct answer. (20p)**

a) When the *Q* output is HIGH, the latch is in the______state.

b) The flip-flop can not change state except on the triggering edge of a_________pulse.

c) A 4-bit binary up/down counters is in the reset state. The next state in the DOWN mode is_______and the next state in the UP mode is_________.

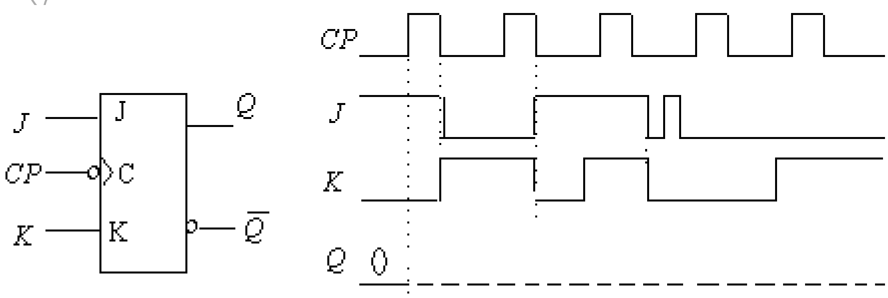
d) A modulus-6 counter has_____states and requires____flip-flops at least.

e) A register has two basic function: data____________and data_____________.

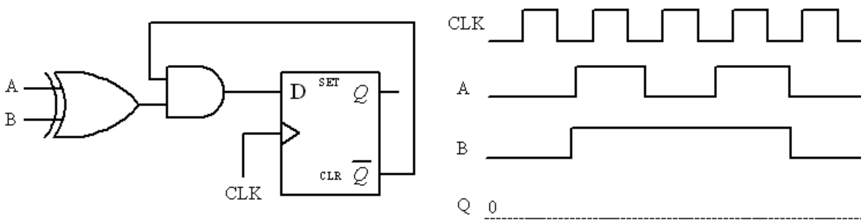
f) In general, a Johnson counter will produce a modulus of____, where *n* is the number of stages in the counter.

g) _____Clock pulses are required to enter a byte of data serially into an 8-bit shift register.

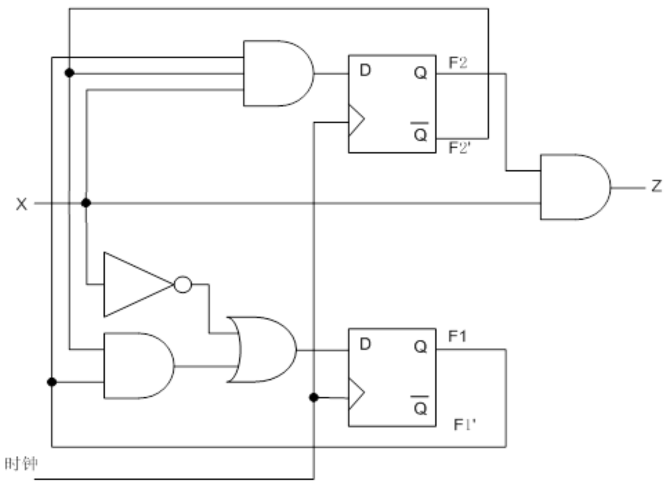
**2. Complete the *JK* flip-flop'timing diagram.(10p)**




**3. Given the logic diagram shown below, complete the partial timing diagram.(10p)**




**4. Given the logic diagram for this problem as the figure, complete follow：a）Write the excitation equations and output equations；b）Write the next state equations； c）Create the state table；d）Create a state diagram.(30 points)**

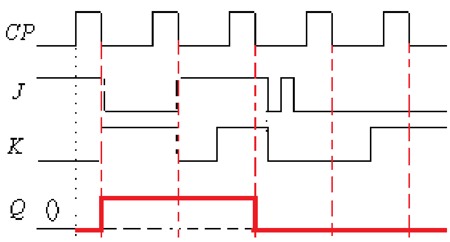



**5. Design a counter with the next-state table, the transition table and the excitation equations to produce the following sequence: 1, 4, 3, 5, 7, 6, 2, 1 , …(30p)**

**1. Fill in the blanks with the correct answer. (20p)**

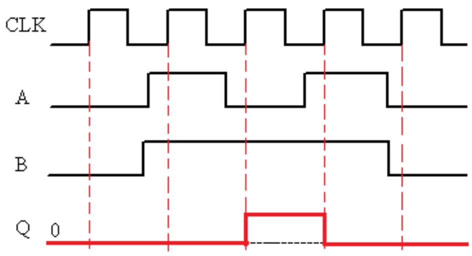
Set Clock 1111 0001 6 3 storage movement 2n 8

**2. Complete the *JK* flip-flop'timing diagram.(10 points)**

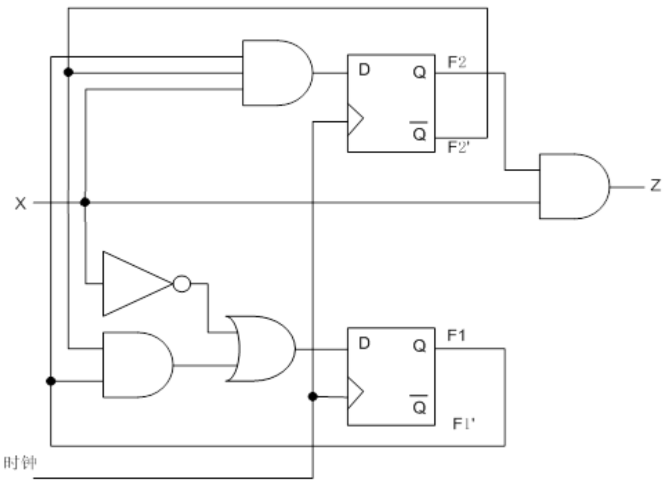





**3. Given the logic diagram shown below, complete the partial timing diagram.(10 points)**




**4. Given the logic diagram for this problem as the figure, complete follow：a）Write the excitation equations and output equations；b）Write the next state equations； c）Create the state table；d）Create a state diagram.(30 points)**




**a)The excitation equations(6p):**

**$D_2 = xF_1F_2'$ $D_1 = x' + F_1F_2'$**

**Theoutput equations(3p): $z = xF_2$**

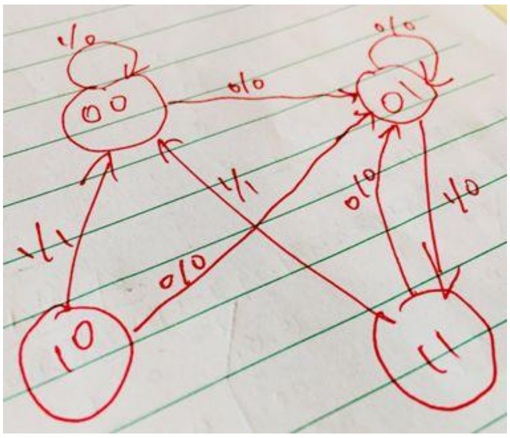
**b)The next state equations(6p):**

**$F_2(t+1) = D_2 = xF_1F_2'$ $F_1(t+1) = D_1 = x' + F_1F_2'$**

**c)The state table(9p):**

| $F_2F_1$ | x=0 | | x=1 | |
|---|---|---|---|---|
| | $F_2(t+1)\ F_1(t+1)$ | z | $F_2(t+1)\ F_1(t+1)$ | z |
| 00 | 01 | 0 | 00 | 0 |
| 01 | 01 | 0 | 11 | 0 |
| 10 | 01 | 0 | 00 | 1 |
| 11 | 01 | 0 | 00 | 1 |

**d)Thestate diagram(6p):**



5. Design a counter with the next-state table, thetransition tableand the excitationequations to produce the following sequence: 1, 4, 3, 5, 7, 6, 2, 1 , …(30points)

The next state table(4p):

| $Q_2(t)Q_1(t)Q_0(t)$ | $Q_2(t+1)Q_1(t+1)Q_0(t+1)$ |
|---|---|
| 000 | xxx |
| 001 | 100 |
| 010 | 001 |
| 011 | 101 |
| 100 | 011 |
| 101 | 111 |
| 110 | 010 |
| 111 | 110 |

The transition table if select the D filp-flops(8p):

| $Q_2(t)Q_1(t)Q_0(t)$ | $D_2D_1D_0$ |
|---|---|
| 000 | xxx |
| 001 | 100 |
| 010 | 001 |
| 011 | 101 |
| 100 | 011 |
| 101 | 111 |
| 110 | 010 |
| 111 | 110 |

The excitationequations(10p):

| $D_2$: | 00 | 01 | 11 | 10 |
|---|---|---|---|---|
| 0 | x | 1 | 1 | 0 |
| 1 | 0 | 1 | 1 | 0 |

$D_2 = Q_0$

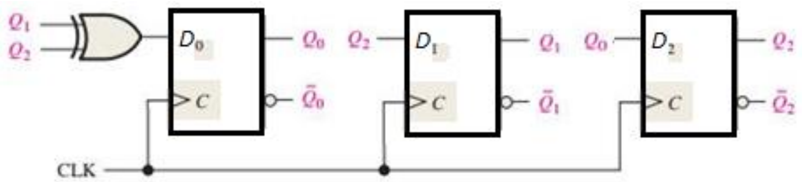
| $D_1$: | 00 | 01 | 11 | 10 |
|---|---|---|---|---|
| 0 | x | 0 | 0 | 0 |
| 1 | 1 | 1 | 1 | 1 |

$D_1 = Q_2$

| $D_1$: | 00 | 01 | 11 | 10 |
|---|---|---|---|---|
| 0 | x | 0 | 1 | 1 |
| 1 | 1 | 1 | 0 | 0 |

$D_0 = Q_2Q_1' + Q_2'Q_1 = Q_2 \oplus Q_1$

The logic diagram(8p):




If select the *JK* flip-flops, the transition table(8p):

| $Q_2(t)Q_1(t)Q_0(t)$ | $Q_2(t+1)Q_1(t+1)Q_0(t+1)$ | $J_2\ K_2$ | $J_1\ K_1$ | $J_0\ K_0$ |
|---|---|---|---|---|
| 000 | xxx | xx | xx | xx |
| 001 | 100 | 1x | 0x | x1 |
| 010 | 001 | 0x | x1 | 1x |
| 011 | 101 | 1x | x1 | x0 |
| 100 | 011 | x1 | 1x | 1x |
| 101 | 111 | x0 | 1x | x0 |
| 110 | 010 | x1 | x0 | 0x |
| 111 | 110 | x0 | x0 | x1 |

The excitationequations(6p):

$J_2 = Q_0$ $K_2 = Q_0'$ ; $J_1 = Q_2$ $K_1 = Q_2'$; $J_0 = Q_2' + Q_1'$ $K_0 = Q_2'Q_1' + Q_2Q_1$

The logic diagram(8p):