

“FPGA/ASIC Design” Program

Entrance Exam

Exam Structure:

“American style” questions

Instructions:

- ✓ Exam duration: 45 min
- ✓ Number of questions: 20
- ✓ To mark the correct answer on page with questions.
- ✓ Only one answer is correct or several if it defined in the question.
- ✓ Auxiliary material:
 - Closed

Grade policy:

Width of the questions defined in the task definition.

Good Luck

Student Name: _____

ID Number: _____

Date of exam: _____

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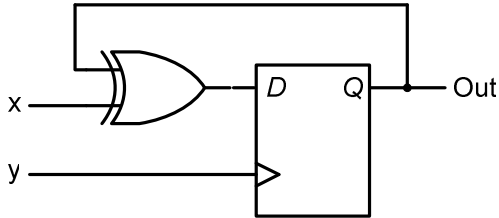
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Question 1

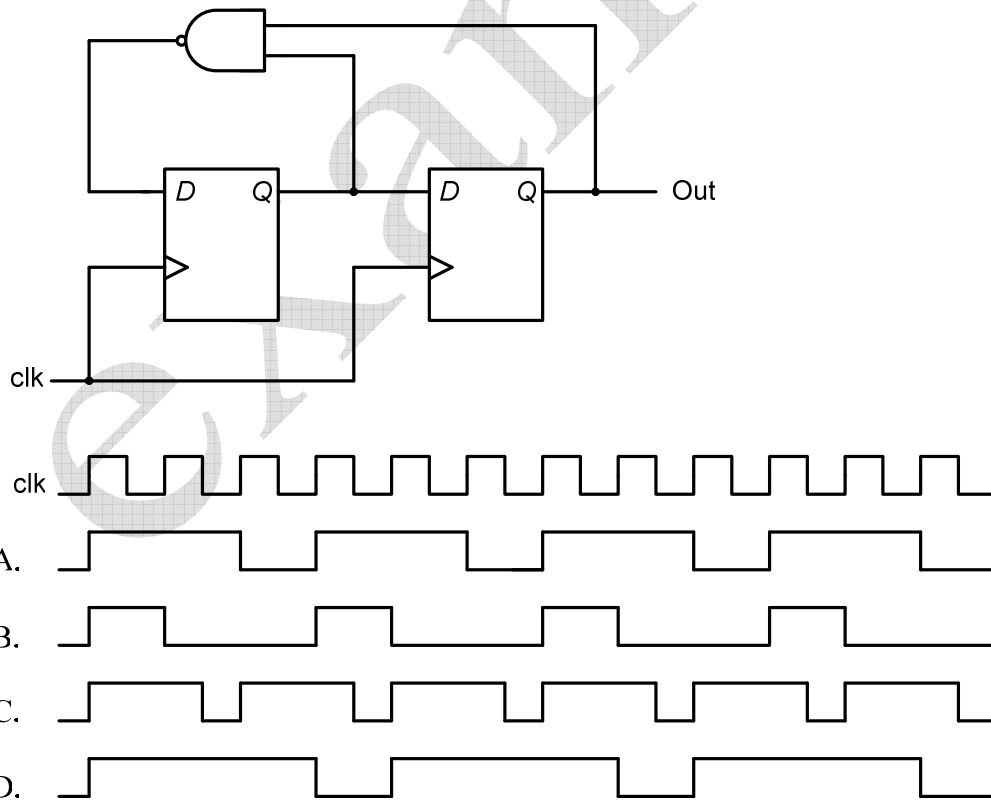
What is a purpose of the following circuit?



- A. D flip-flop with enable.
- B. Positive edge detector.
- C. D latch
- D. T flip-flop.

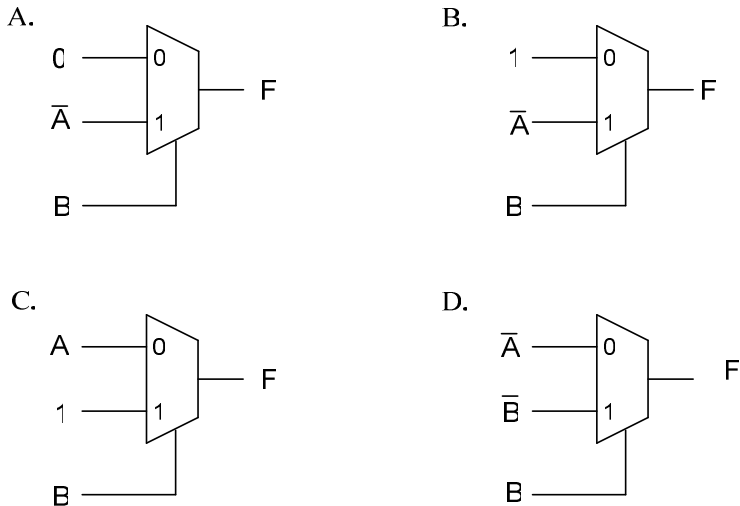
Question 2

Choose the correct output of the circuit...



Question 3

Which one is NAND equivalent?



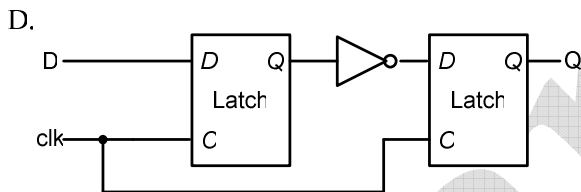
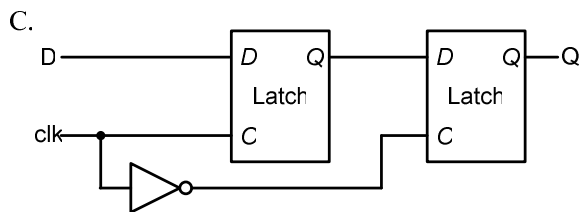
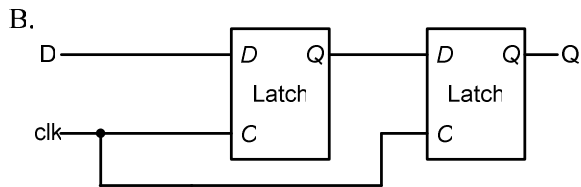
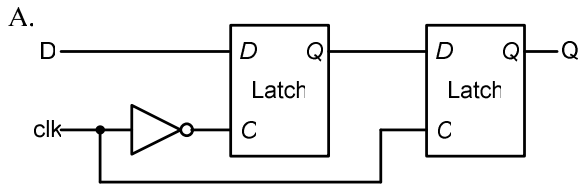
Question 4

When does NAND gate sources most of its power

- A. At reset time.
- B. While its 2 inputs are equal.
- C. During transition time.
- D. When it 2 inputs not equal.

Question 5

Which of following circuits is a positive edge triggered D flip-flop?



Question 6

Which of the following equations is Full Adder?

- A. $SUM = A + B + Cin$; $Cout = (A + B) \cdot (A + Cin) \cdot (B + Cin)$.
- B. $SUM = A \cdot B \cdot Cin$; $Cout = (A \cdot B) \oplus (A \cdot Cin) \oplus (B \cdot Cin)$.
- C. $SUM = A \oplus B \oplus Cin$; $Cout = (A + B) \oplus (A + Cin) \oplus (B + Cin)$.
- D. $SUM = A \oplus B \oplus Cin$; $Cout = (A \cdot B) + (A \cdot Cin) + (B \cdot Cin)$.

* A, B → Inputs, Cin → Carry in, Cout → Carry out

Question 7

Which of the following devices are parts of CPU?

- A. Accumulator, ALU, registers, program counter, disk controller, and bus interface.
- B. Accumulator, ALU, registers, program counter, stack pointer, and bus interface.
- C. FPGA, RAM, ROM.
- D. Accumulator, ALU, registers, DMA controller, and bus interface.

Question 8

Choose the correct functionality of the CPU fetch

- A. The contents of PC are loaded into Accumulator;
Value in the PC is incremented;
The instruction is loaded into the MDR from memory;
The contents of the MDR are loaded into the IR;
- B. The contents of PC are loaded into MAR;
Value in the PC is incremented;
The instruction is loaded into the MDR from memory;
The contents of the MDR are loaded into the IR;
- C. Value in the PC is incremented;
The contents of PC are loaded into MAR;
The instruction is loaded into the MDR from memory;
The contents of the MDR are loaded into the IR;
- D. The contents of MAR are loaded into PC;
The instruction is loaded into the MDR from memory;
The contents of the MDR are loaded into the IR;
Value in the PC is incremented;

Question 9

What are the flags that CPU includes? Choose the correct answer.

- A. Zero, carry, overflow, negative flags
- B. Zero, overflow, carry, positive flags
- C. Zero, overflow, carry flags
- D. Negative, positive, borrow, overflow flags

Question 10

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What happens when interrupt occurs?

- A. Program counter load by suitable interrupt routine address.
- B. The CPU saved the old values of program counter and flags, to stack, then Program counter loads by suitable interrupt routine address.
- C. The CPU saved the old values of flags, to stack, then jump to suitable interrupt routine address.
- D. Peripheral to interrupt host from working with other peripheral.

Question 11

When do we use DMA?

- A. When we want to send data to UART that have no transmit buffer.
- B. When we want to send big block of data from memory to memory, and we want to do this as fast as possible.
- C. When we want to send big block of data to I/O device that can't request interrupt from CPU.
- D. When we want to send data to UART that have small transmit buffer.

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